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NEWSPAPER

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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DP Tackles Football

Ken Payne, a wide receiver for the Philadelphia Eagles, scores against the Houston Oilers in a preseason game. Univac will help Philadelphia's WCAU-TV prepare biorhythm information on key players for the Eagles and their opponents in the National Football League prior to each game this season in hopes of predicting the results. See story on Page 7.

Longer Zip Code Set; DP Change Seen Costly

By Don Leavitt
CW Staff

WASHINGTON, D.C. – The U.S. Postal Service has announced plans to add four digits to Zip Codes by 1981 to help keep down postage rates, but DPers are beginning to see the other side of the picture — the cost of modifying existing systems to handle the enlarged Zip fields.

Postmaster General William F. Bolger said the decision to go with an add-on system will substantially reduce costs within the Postal Service and will improve service by reducing sortation errors and speeding mail processing. He characterized the move as a logical extension of the Zone Improvement Plan which was announced in 1961 and introduced in 1963.

The action is similar to the telephone companies' introduction of area codes, Bolger said, which has enabled the carriers to increase their electronic switching capability, hold down rates and improve service.

The banking system also uses an expanded numbering system to aid in the automated processing and sortation of checks, Bolger noted.

The current five-digit Zip Code guides the sorting of letters and other mail to 40,000 post offices, stations and branches. The additional four numbers will carry the process further. Within all five-digit delivery areas each block of a street, office buildings and companies receiving large volumes of mail will be assigned a four-digit, add-on number, the postal official explained.

That will enable the Postal Service to use optical character recognition (OCR) equipment more efficiently and ultimately allow eight or nine workers to do the work now done by 20, Bolger claimed, but Allen B. Durgin, who runs a small installation in Connecticut, sees another picture.

'Frightening' Image

Shortly after hearing of the plan to expand the Zip Code, Durgin began to research the effect it would have on his current operations, which are based on an IBM System/3 and therefore small compared with many installations with more extensive gear.

Two days after he started, Durgin was still tallying the impact. Yet he al-

(Continued on Page 8)

At Kyoto Conference

Societal Impact of DP Examined

By Ronald A. Frank
CW Staff

KYOTO, Japan – The profound effects computers, communications and microprocessors may have on society were outlined by speakers here last week at the International Conference on Computer Communication (ICCC '78).

Coverage of ICCC '78 continues on Page 6.

In an opening day address to the conference, Dr. Yasusada Kitahara, executive vice-president of Nippon Telegraph and Telephone Corp., said networks can be used to solve problems created by the concentration of population in urban areas. A computer communications network dealing with visual as well as audio information, for example, would rearrange social functions so that employment patterns could change. Such a net would eliminate the need for workers to spend time each day commuting, he said.

This type of network would decentralize and rearrange social functions and could also contribute toward alleviating energy problems, he noted.

Another social effect of technology was outlined by Peter Gassmann of the Organization for Economic Cooperation and Development, who warned that job opportunities, especially for young people, could be greatly diminished as a result of greater reliance on automation caused by the spread of microprocessors.

In West Germany, there have been strikes in the printing and metalworking industries because trade unions fear electronics automation. They believe this will eliminate jobs or downgrade workers' skills, he explained.

Business Mini Weighs 65 Pounds

By Brad Schultz
CW Staff

CUPERTINO, Calif. – If a small TV screen were to sprout from an electric typewriter, the result would resemble the business-oriented minicomputer Durango Systems, Inc. unveiled here last week to compete against systems from much better known vendors.

The Durango F-85 packs an 8-bit microprocessor, read-only memory (ROM), random-access memory (RAM), dual diskette drives, CRT, keyboard and bidirectional printer into one 65-pound unit.

According to a Durango spokesman, the F-85's compactness, multitasking capability and capacity for millions of bytes of storage give the firm two to two and a half years lead time on the rest of the industry. The desktop system is said to need only 250W of power.

At a purchase price of $13,520, the F-85 is primarily targeted for the end user with a small business, but will also be sold to large businesses for remote job entry applications, according to John M. Scandalios, Durango vice-president of marketing.

The system's ROM holds up to 8K bytes. RAM ranges from 48K to 65K bytes. Diskette storage can be extended from 946K to 1.89M bytes – or with auxiliary drives up to 3.78M bytes. Another 10M to 20M bytes of fixed-disk storage is also available, Durango said.

(Continued on Page 4)

IN DEPTH
IN DEPTH

Ill-prepared to deal with Abend dumps, Cobol programmers face 'both a dilemma and paradox' when one occurs. What are the options? See Bernard H. Boar's 'Abend Debugging and the Cobol Programmer' beginning on Page 19.

IBM Snips Witness List Again

By Marguerite Zientara
CW Staff

NEW YORK – In an effort to expedite the judicial process, IBM last week dropped four of its upcoming "competitor" witnesses, bringing to seven the total number of witnesses the firm has eliminated since the end of the summer recess in the U.S. vs. IBM antitrust trial here.

In a robing room conference last week, IBM attorney Alan Hruska said witnesses without "great comprehensive testimony" do not need to use up valuable court time by appearing. The witnesses' relevant points can be brought out by placing their depositions into evidence, he said, adding that it would be a waste of the court's time to call the witnesses since the points have already been made and recorded.

However, Robert Staal, lead government attorney, said the seven recent drops have "severely impacted" the government's discovery process. Of those seven, Staal said, only two have not been deposed by the government (one was deposed by IBM with the government present).

(Continued on Page 8)

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Keeps Users Loyal

Third Parties See 3031 AP as Ploy

By Marcia Blumenthal
CW Staff

While IBM was mum last week on its game plan for the 3041 attached processor (AP) introduced two weeks ago for its 3031 CPU [CW, Sept. 25], third-party dealers were not so reticent.

With an announcement like this, the user may become paralyzed, which is just what IBM wants. If IBM never sells one 3041, it may have accomplished its objective," Michael O'Connell, executive vice-president of Comdisco, Inc., suggested.

O'Connell and other third-party 3031 vendors see the AP as a marketing tool designed to keep users and potential users from switching to plug-compatible CPUs, which until now have offered better price/performance ratios.

During an informal polling by *Computerworld*, the third parties also said the 3041 is a logical extension to the 30 series and predicted APs for other models in the line. Many consider the 3031 a reworked 370 and pointed to the similarity between the AP strategy for the 3031 and the 370/158.

However, none of the dealers surveyed said they had experienced demand for increased capability for the 3031.

An IBM spokesman said the introduction of the 3041 was prompted by an assessment of customer needs. However, he declined to answer any further questions, stating it was the company's practice not to comment on specific business plans.

Ploy to Confuse Market

Another vendor, which asked not to be identified, said IBM will continue to deluge customers with product announcements to confuse the marketplace. This tends to make customers avoid decisions to switch equipment manufacturers.

"Any time IBM can get a customer to wait, it is coming out ahead,' the vendor maintained.

Looking at IBM's move from the customer's perspective, John Greene, manager of market planning for Computer Systems of America, Inc., said of the 3041 that "it's not a lot to pay for the increase in power and performance."

Green declared that IBM is on a "line-holding expedition" and is trying to give its customer base the same kind of throughput offered by the plug-compatible CPU makers, like Amdahl Corp. with its 470V/5.

Reinforcing the opinion that the 3041 is a marketing tool, Green noted that if the 3031 were compute-bound, then the 3041 would offer a solution. However, he said, computers on the whole are I/O-bound, and one way of making them appear something they are not is to increase the performance.

"If you look at what competitors are claiming, the Amdahl V/5 is a better performer than the 3031 alone. But with the 3041, the 3031's performance is knocked above the V/5 or the V/6," Green continued.

Schedule Balancer

Green rejected the view of Robert T. Fertig, vice-president of Advanced Computer Techniques Corp.'s Technology Analysis Group, that the 3041 is a way of balancing IBM's production schedule.

Fertig, an avid IBM-watcher, suggested that some customers who would have had to wait two years for 3032s or 3033s will now consider the 3031 with an AP rather than endure delay.

Green countered with the opinion that IBM is coming close to the end of its delivery problems, adding that he does not consider it IBM's style to promote one of its products at the expense of another.

Fertig concurred with others who said IBM introduced the 3041 as a way of warding off plug-compatible CPU competition.

Comdisco's O'Connell indicated he really wasn't surprised by the 3041 announcement. "IBM is going to milk the machines that are in the field as long as it can, until it has to do something dramatic," he said.

No Renovations

Aside from the assessment that the 3041 is a competitive answer to plug-compatible machinery, William Grinker, exective vice-president of American Used Computer Corp., said the 3041 will give 3031 users more capability, avoiding plumbing and electrical renovations which could cost a user up to $250,000 in installation preparation if he has no upgrade options other than the 3032 or 3033.

Grinker speculated that the AP will have a positive impact on the market for used 370/158 mainframes because the 3031 with the AP is a natural upgrade from the 158's similar architecture.

Joseph Kelly, national sales manager for Randolph Leasing Co., agreed with Grinker, saying the 158 AP user can achieve better price/performance with a 3031 AP configuration than by migrating to a 3032.

Marketing staff of Itel Corp., which introduced the AS/5-3 AP at the same time IBM introduced the 3041, were away at a meeting and were unavailable for comment.

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"During our SVS test evaluation period, for example, we found that ROSCOE's overhead was under 1 percent per terminal while the other system we evaluated required up to 4.5 percent per terminal.

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Ristol Turns Himself In; $600,000 Still Missing

By Tim Scannell
CW Staff

LOS ANGELES – Arne Ristol, a 52-year-old self-employed bookkeeper accused of stealing nearly $1 million mistakenly credited to his bank account will remain in custody here while police ponder the riddle of what happened to more than $600,000 of the money

Ristol is scheduled to appear this week in Los Angeles Superior Court to face charges of grand theft in connection with the disappearance of $927,288 accidentally deposited into his account at the United California Bank (UCB) He surrendered to authorities last month, pleaded innocent and is currently being held on $100,000 bail.

Although the bank has refused to elaborate on the nature of the crime, police investigators speculated a keypunching error may have been responsible for the accounting mistake which occurred in early June. The bank reportedly discovered the error when the true depositor, a local real estate company questioned the bank on the whereabouts of its money

According to a bank spokeswoman, Ristol drained the account through a series of small withdrawals within the six or seven weeks following the error The account was apparently depleted of everything except $1,100 by checks written to an unknown number of people

All we know is that a dozen checks have been written and that there is a civil suit against several people, UCB s Lerner said

Lerner declined to comment on why it took UCB nearly three months to uncover the error or why the bank itself failed to notice the discrepancy

Every banking system has a series of checks and balances, Lerner said and if in fact they fail, they would fail more often were they public information

Investigators initially believed Ristol had fled to Florida but learned, upon his surrender, that he had traveled to Europe on a long-planned vacation," Eugene Andres, Ristol's attorney, said. Ristol purchased a one-way trans-Atlantic ticket and left the U.S on Aug. 9, the same day the California bank discovered the error in his account, according to Kellogg Chan, the deputy district attorney assigned to the case.

Ristol reportedly flew from Los Angeles and arrived in Stockholm via Copenhagen and Helsinki. While in Europe, he allegedly laundered the funds by using what investigators believe to be a complicated series of deposit and withdrawal maneuvers between European, American and Canadian banks

According to bank officials, $750,000 of the booty was channeled from the UCB account to a Montreal bank by a Canadian accountant who subsequently denied having any knowledge that the money was stolen. The money was then withdrawn from the Canadian account and transferred to the Cantrade Bank in Zurich, Switzerland.

A portion of this money, approximately $150,000 was later returned to the U.S. and deposited into the accounts of two companies in which Ristol allegedly had an interest – Strawberry Valley Estates in Nevada and Strawberry Valley Development Co. in Arkansas. UCB authorities have filed suit seeking to freeze the money, which they believe was used to pay mortgages and liens on property owned by at least one of the companies.

Ristol used $100,000 of the well-traveled money to pay a debt owed to a business associate and an additional $38,000 to purchase stock in the Western Empire Corp., a company in which the associate is a major stockholder, Daryl Hanson, Ristol's civil attorney, said. UCB officials said a small portion of the $38,000 has been located and frozen pending further investigation.

To date, only a third of the $927,288 has been located and a very small percentage has been returned, according to Donald Crivellone, UCB's administrative vice-president. "We have gone into court and gotten temporary restraining orders on less than $300,000, but we have recovered almost none of it," he added.

Meanwhile, Ristol's attorney has asked for a reduction of the court's $100,000 bail, noting that his client had elected to surrender and that he has no prior convictions.

We aware of where he was and it was just a matter of time before Interpol picked him up," Chan declared.

Small Business System Weighs 65 Pounds

(Continued from Page 1)

F-85 software includes a real-time executive operating system; Isam, random and sequential file access; an Extended Basic compiler/interpreter; various applications packages, and packages for emulating Ascii and IBM 2780/3780 communications protocols.

Through asynchronous serial ports, the F-85 can accommodate up to four additional terminals operating at rates up to 1,200 bit/sec Multitasking is allowed Durango stated, putting the system's memory access time at 250 nsec.

An integral modem with auto-answer capability and RS-232C 20mA current loop and IEEE 488-1975 parallel interfaces are provided as well as a high-speed serial synchronous or asynchronous interface operating at speeds up to 9,600 bit/sec.

The CRT displays 24 lines of 80 characters each and the printer yields a 9 by 9 dot matrix at 165 char./sec, Durango stated

Durango product manager Galyn Prescott demonstrates the F-85's portability.

The F-85 can store far more information than the IBM 5110, which does not have multitasking, Scandalios claimed Neither Qantel Corp.'s Model 210 nor Wang Laboratories, Inc's models 1100 and 2200 have the F-85's range and flexibility of storage, he continued, adding that neither can accommodate fixed disks.

He also rated the F-85 over Digital Equipment Corp. and Data General Corp OEM business systems, including the DEC Datasystem 78, 308, 310 and 320 and DG's CS20 through CS40 and Micronova.

The F-85's Basic is said to permit I/O formatting, external subroutines, string and array processing and 16-bit integer and floating-point decimal arithmetic with 14-digit precision. The language offers an interactive editor.

Application software includes general ledger and accounts payable programs. Packages tailored to user needs are also available, the firm said.

Scandalios seemed to take special pride in the F-85's compactness. 'What we ve done is design a product that integrates the peripherals and the processing mechanisms, using the printer as the base," he said. "The resulting product has 40% of the parts of a conventional system and uses half the energy – roughly that needed by two ordinary lightbulbs.

'The IBM 5110 . . . is a conventional three-box system. It has a processor with a small display screen and a separate printer and a separate package to house the two diskettes. That weighs 234 pounds, he continued.

From a design standpoint, the product is very significant to the industry. I think it's going to show the way for all future designs of systems requiring a printer as well as diskette storage, processor and CRT. Why should you have three boxes, anyway?"

Durango will perform all San Francisco-area maintenance. Service for the rest of the nation will be done by California Computer Products, Inc

Durango is located at 10101 Bubb Road, Cupertino, Calif. 95014.

What Is Durango?

CUPERTINO, Calif. – Durango Systems, Inc. was founded in August 1977 by three veteran computer industry executives who believed they had "a better computer."

The three executives are George E. Comstock, John M. Scandalios and Charles L. Waggoner, who founded Diablo Systems, Inc. and then sold it to Xerox. The trio envisioned a computer that would marry the significant increases in the capability of semiconductors with the similar advances in random-access storage devices and serial printers.

That computer is the Durango F-85, unveiled here last week. The F-85 will enter the market in late 1978 with full production scheduled for 1979

Comstock is the president of Durango; Scandalios, the vice-president for marketing; and Waggoner, the vice-president for engineering.

Initial financing for the firm was accomplished in September 1977 with a $1.5 million equity investment made by a group led by Sutter Hill Venture and Citicorp Venture Capital, Ltd. A planned second round of financing – an added $2.5 million equity investment – was completed last July.

The original investors were joined in the second round by Genstar Ltd., a Canadian multinational listed on the New York Stock Exchange; Kleiner, Perkins, Caufield & Byers; and Mayfield II.

Durango Systems has also arranged a bank line of $800,000 to acquire capital equipment.

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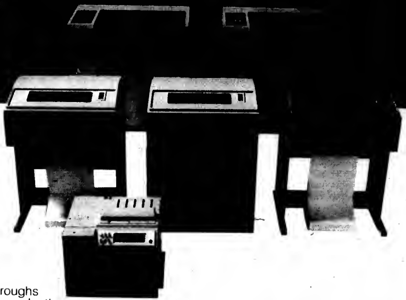

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Dependence on DP Total, Keynoter Declares

By Ronald A. Frank
CW Staff

KYOTO, Japan — In a few years the bulk of the world's information will be available in computer-based, computer-processable form, and some classes of information will not even exist in any other form, according to Dr. Keith A. Uncapher of the University of Southern California Information Sciences Institute.

Delivering one of three keynote speeches at the fourth International Conference on Computer Communication (ICCC '78), sponsored by the International Council for Computer Communications at the Kyoto International Conference Hall here last week, Uncapher said the dependence of business, industry and government on the computer is virtually total.

CW at ICCC '78

Even partially automated systems will tend to make manual information systems disappear, he added, and soon no options but those systems-driven computers will exist.

The rapid progress now being made in digital communications will render obsolete the distinction between communications and computing, between postal and telegraph communications and between terrestrial, radio and satellite systems, Uncapher predicted. Inevitably, data, voice, graphics and facsimile all will be transported via common digital communication links managed and controlled by computers.

In this environment, the personal terminal will increasingly be used to provide the individual with access to information from the outside world. The personal terminal will be used primarily for communications rather than computing, Uncapher explained. Arpanet users already utilize an electronic mail system to share resources and collaborate on-line.

These users find asynchronous nonreal-time communications geared to the personal convenience of both parties and the informality of communications via interactive terminals to be productive for scientific uses. These concepts will be extended into nonscientific domains to open new forms of communications for most users, he said.

The personal terminal will become the common access method for electronic mail and will be used in such applications as banking, shopping, purchasing and billing, Uncapher forecast. The telephone, having become integral to the terminal, will be treated as an alternate path when real-time communications are required, he said.

People to People

What will emerge will be networks of terminals linking people to people, to information sources and to private, corporate, national and international networks, he predicted. The personal terminal will be the instrument that supplies users with information processing and related communications for voice, numerical information and facsimile plus other forms, he said.

Examples of the emerging services were described by Masaya Yamauchi, managing director and director general of the Research and Development Bureau at Nippon Telegraph and Telephone Corp. In Japan, push-button telephones can be used to provide calculation services and reserve seats on trains. In addition, the Prestel Service in the UK and Captain in Japan provide users with access to data bases at DP centers via CRT terminals.

The next generation of services will include an integrated system of computers and communications. This was described by Yamauchi as the Integrated Services Digital Network (ISDN), which will have physical and logical as well as service aspects.

The physical aspects will include phone lines, switches and terminals. The logical aspects will include the tariff, protocol and "bearer rate," while the service aspects will combine voice, telegraph, data and video, Yamauchi predicted. ISDN will be able to meet a wide spectrum of demands from the general public as well as business users, he added.

Meeting Attended by 900

KYOTO, Japan — The International Conference on Computer Communication (ICCC '78) here last week was attended by more than 900 delegates who represented 30 countries and heard 118 papers on a mix of both technical and societal subjects.

At the opening session, Peter Jackson, president of the International Council for Computer Communication, the conference sponsor, said earlier meetings had concentrated on technical issues associated with building packet-switched public data networks, but applications are now being stressed.

"In the past, we were excused for playing with our network toys, but now it is high time we emphasized the practical uses of these networks," according to Jackson, who is with Bell Northern Research in Canada.

The ICCC conference is held every two years. The 1980 meeting is scheduled for Atlanta, with AT&T acting as the host organization.

Nations Seen Uncertain on Privacy Action

By Ronald A. Frank
CW Staff

KYOTO, Japan — There is much concern in the U.S. and elsewhere that the adoption of international privacy protection criteria, in whatever form, could disrupt international economic activity. At the same time, the concern for protection of personal data is genuine and motivated by deeply felt political and social values, according to William L. Fishman, deputy associate administrator for policy analysis and development at the National Telecommunications and Information Administration (NTIA) in Washington, D.C.

In a paper prepared for delivery at the International Conference on Computer Communication (ICCC '78) and presented by another conference participant, here last week, Fishman cautioned that there is "some uncertainty" about the need for international action, the form it should take, the motives behind the call for such action and the ultimate implications. It is commonly recognized among free societies in the international community that to receive and impart information is a basic right.

But even in the U.S., such rights are not absolute and must be balanced with regard for national security, public health, public morality and similar concerns, the paper said.

A question that may be related to the free flow of information concerns the cost and availability of telecommunications facilities. In this regard, the European postal, telephone and telegraph authorities (PTTs) have for a number of years "been watching with alarm" the growth of private-line services and networks.

The telecommunications authorities appear to regard these nets as "incursions on their state-granted monopoly and something which should be minimized." As a result, the PTTs of Western Europe appear to be trying "to reduce customer use of private lines both by making them less economic and by offering new public data networks tailored to the special needs of the data [communications] community," Fishman said in his paper.

A recent contribution by the Italian telecommunications authorities at a meeting of the Consultative Committee on International Telephone and Telegraph (CCITT) "epitomizes these pressures," Fishman said. Pressures have been brought to bear on private-line users to abandon their current facilities and "surrender themselves . . to the monopoly facility and pricing control of the PTT," he wrote.

Excessive prices, just as much as privacy protection rules, could function as a barrier to international data flow. This may have implications for the privacy question but it certainly relates to the broader issue of transborder data flow, he said.

Despite the international activity and the potential threats posed, many people, particularly in the U.S., are not yet convinced the problem is big enough, or widespread enough, internationally to warrant the major step of broad international action, Fishman wrote.

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Purchase Prices Not Affected

System/3, 32, 34 Get Rental and Lease Hikes

By Don Leavitt
CW Staff

ATLANTA — IBM's General Systems Division last week announced price increases for several of its products including the System/3, the System/32 and the System/34, as well as price adjustments for certain maintenance services.

Rental and lease prices for the products will increase approximately 2% to 5% as of the first of next year; purchase prices are not affected, according to a spokesman.

Also announced were adjustments to "most" minimum monthly maintenance charges, with increases of up to 20% and reductions of up to 10%. While increases will not take effect until January, reductions went into effect as of Oct. 1.

Since the Series/1 minicomputer and the 5100 and 5110 desktop systems are available only through purchase, they were not affected by last week's announcement, the spokesman noted.

To illustrate the impact of the changes, he said a System/13 Model 4 has been available for $659/mo under a rental plan or $599/mo under lease; these costs will be $691 and $628, respectively, under the repricing. Maintenance for these units will rise from $160/mo to $168.

In the Model 6 grouping, the configuration with 8K bytes of Mosfet memory will move up from $741/mo to $778 rental and $674/mo to $707 under a lease plan. The 12K-byte system, which was $888/mo or $807 depending on whether it was rented or leased, will be available for $932/mo or $847, according to the spokesman.

Maintenance charges will not be changed for "most" Model 6s, he added.

One exception to the pattern of increased or unchanged maintenance charges occurs in the System/3 Model 8 options. Support for the 2074 Binary Synchronous Communications Adapter dropped $5/mo from $68 to $63.

On the other hand, rental for the device will jump from $329/mo to $344 while leases face an increase of $15/mo from $299 to $314, the spokesman acknowledged.

The spokesman declined to continue the countdown through other products affected since the list is long and the details are only important to those with specific patterns of processor, peripherals and options.

IBM said the price adjustments "reflect normal business reviews."

CPU Tackles Football Team's Biorhythm Data

PHILADELPHI. — A mainframe maker is cooperating with the Sports News Department of WCAU-TV, Channel 10 here, to provide computerized information on biorhythms for key players on the Philadelphia Eagles football team and their opponents during the current football season.

The biorhythm information is being provided to WCAU-TV's viewing audience on the Dick Vermeil show at 12 noon on Sundays immediately prior to each game.

Using the players' birth dates and the date of the game, a Univac 90/70 computer at the DP manufacturer's world headquarters in Blue Bell, Pa., charts selected players' physical, intellectual and emotional ups and downs. According to the biorhythm theory, a person's good or bad days are directly related to the ups and downs of his physical, intellectual and emotional cycles.

The physical cycle is 23 days, the intellectual is 33 days and the emotional 28 days. The cycles are plotted like sine waves on a graph; when the curve is moving up toward the line, the biorhythm promises a good day.

Theoretically, if a person is above the 0 line physically, he should have a lot of energy; if he's above the line intellectually, he should be able to think faster and more logically; and if he's on the top emotionally, he should be more creative and cheerful.

When the curve drops below the zero line — toward the -1 line — the opposite happens. The person is likely to be accident-prone, and a number of things can possibly go wrong. The critical day is when the curve crosses the 0 line.

'Biorhythm Edge'

Prior to each game, data on key players for the Eagles and the opposing team is fed into the computer via a Uniscope 200 CRT terminal. A special program then goes to work on the data and produces the ups and downs of the various players on the terminal screen for the particular day of the game. This same information can be produced in hard-copy form.

The resulting information for each team's key players is then compared and analyzed to which team has the "biorhythm edge" and is most likely to win.

A similar program was operated last year for games played by the Minnesota Vikings. The predictions turned out to be 95% accurate.

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IBM Doesn't Control Market, User Testifies

By Marguerite Zientara
CW Staff

NEW YORK — "IBM is a strong force in the computer field — a force to be considered — but it is not a controlling force in the field," John L. Jones, vice-president of management information systems for Southern Railway Co. (SR), testified recently at the U.S. vs. IBM antitrust trial here..

Jones, IBM's fourth user witness, also said he feels that IBM is not a "dominant force" in the DP marketplace and specifically not at SR's central DP site in Atlanta. Jones said IBM cannot cause SR to install additional IBM equipment, upgrade present IBM equipment or keep SR from putting additional processing applications on its Data General Corp. equipment.

He further claimed that because of what he characterized as IBM's "centralized approach to applications systems design and implementation" SR has spent money that could have gone toward a larger IBM central site machine on smaller DG machines and processing in the field instead.

SR's central site in Atlanta has four IBM 370/158 CPUs, but SR's large railroad car switching yard in Sheffield, Ala., uses five DG Nova 1200 minicomputers for its inventory control and process control functions. According to Jones, who designed the system, this was a revolutionary idea when it was implemented back in 1973, before anyone had ever heard of distributed processing."

The great success of SR's DG-based system and the subsequent proliferation of distributed processing systems throughout the DP community has led Jones to believe that IBM had better change its orientation from a centralized systems design and implementation approach to a distributed processing approach if it wants to keep its customers, he testified.

Much-Debated Definition

During his two weeks on the stand, the railway vice-president also addressed another key issue in this trial — the definition of a "general-purpose computer." According to Jones, a general-purpose computer is a system comprised of "input equipment, output equipment, storage, arithmetic circuitry, controls [and] memory and that can store and execute internally stored programs."

Under government cross-examination, he discussed possible alternatives to SR's IBM-equipment-based central DP site and his reasons for not choosing those alternatives in 1974, when SR acquired the 370/158s.

Jones' major reason for buying 370/158 processors, he said, was their compatibility with SR's existing 360 network. He testified that he knew of no plug-compatible alternatives at that time outside the IBM family of computers.

When asked why SR never considered or evaluated 158-equivalent equipment from Honeywell, Inc., Univac, Burroughs Corp. or Control Data Corp. for the 1974 purchase, Jones said that since he had never heard that those vendors' products were plug-compatible, he did not consider them plug-compatible and therefore did not evaluate them.

In a number of cases, Jones said, he chose to acquire IBM peripheral equipment instead of other vendors' because he was confident it would be successful in SR's DP environment and he did not want to make errors that would cost his company money instead of saving it. He even stated at one point, "My job is not to save money, but to make money" for the company.

The user witness said that on occasion, he has signed performance agreements with various companies, requiring that certain performance levels be demonstrated prior to payment by SR. If the levels were never met, the equipment would be removed without payment to the vendor..

Jones said he never felt it necessary to sign such an agreement with IBM because the firm had always been "extremely good" in the areas of delivery, performance, service and support.

IBM Pares Its List of Witnesses Again

(Continued from Page 1)

The sudden acceleration of the case schedule leaves the government unprepared for upcoming witnesses. "We are almost out of deposed witnesses at the moment," Staal said.

The issue raises "another serious problem" for the government: The witnesses have not been cross-examined. The deposition process was devoted to finding out what the witnesses planned to say on IBM's behalf and therefore the depositions represent only a partial record and one that is "very much slanted in that sense for IBM," according to Staal.

Hruska, however, stated that whenever a deposition is taken, there is the possibility the witness's words will be put into evidence "for one reason or another." He also said that if the government wants to further examine a witness, it is free to call the witness in its rebuttal case.

In a second robing room conference, Staal proposed that there be a minimum 10-day period between the deposition of a witness and his appearance in court. Hruska would not agree to what he termed a "straitjacket" rule, but he did agree to try to determine as soon as possible which witnesses will definitely appear in the next two or three months and, in the case of dropping witnesses, to notify the government as soon as possible.

Although the government is momentarily inconvenienced, during its direct case it dropped witnesses in much the same way as IBM has just done. As Hruska pointed out in the robing room conference, IBM deposed 77 witnesses on the government's initial witness list who were never called to testify by the government.

The IBM witnesses dropped last week who were deposed by the government are George E. Mueller, chairman and president of System Development Corp.' Walter R.T. Witschey, president and treasurer of the Computer Co.; Thomas I. Harris, president of Optical Research Associates; and Russell C. DuBois, vice-president of operations for Omron R&D, Inc.

2nd edition "Winning Proposal"

Mercury details new guidelines for gov't. unsolicited proposals

In response to the recent policy shift by OFPP on unsolicited proposals, Mercury Communications has released a new updated edition of *How to Create a Winning Proposal.* First published by Mercury in 1976, *"Winning Proposal"* rapidly became an international standard guide for use in both government and commercial proposal efforts. It is currently being used by over 15,000 research, manufacturing and service companies as well as numerous government, military and civilian agencies.

The new edition features updated information on requirements for preparing and submitting unsolicited proposals to Uncle Sam. Included is an explanation of the new government-wide regulations concerning acquisition, contracts and awards. In addition, the book details the recommended standard format for unsolicited proposals now accepted by all government departments and agencies. It also provides: a list of common evaluation criteria generally applied to unsolicited proposals, information on how to identify and reach the right target for your proposal, and excellent guidelines for negotiating the best possible contract or award for your particular project.

Copies are available prepaid from Mercury Communications Corp., 730-P Mission St., Santa Cruz, CA 95060. $49.95 (check or money order) includes shipment. In Calif. add $3.00 tax. Master Charge and VISA orders accepted. Please state card no. and exp. date. C.O.D. orders call 408/425-8444.

Nine-Digit Zip Planned

(Continued from Page 1)

ready could foresee that 40 disk files would require expansion, 145 programs would have to be changed and recompiled and 81 job control procedures would have to be revised.

Beyond that, Durgin said six input documents would require changes — and reprinting, six data entry functions would require modification and 40 conversion programs — to perform the file alterations — would have to be created, tested, debugged and then thrown away.

His estimates of the time needed and the costs associated with such a wholesale conversion led Durgin to visualize the effect of the change on all the computer systems installed throughout the U.S. The image was "frightening," he said.

He also found the image irritating: "We in the DP field realize more than others that change is an opportunity. We also realize that a sound blend of good business judgment needs to be applied together with a realistic consideration of the degree of success, effect and acceptance of such a change.

"But when we consider the cost of past changes instituted in post office automation and compare the benefits derived in terms of improved service, the results are all too clear."

Durgin questioned how much thought and discussion had gone into the proposal to enlarge the Zip Code, weighing the cost to the postal customers against the potential improvement in service.

For his part, Bolger noted that precise figures on savings that may accrue from the use of add-on Zip Codes have not yet been developed since they are dependent on such variables as mail volume, the inflation rate and labor costs. But he termed the potential "highly significant."

Implementation plans call for the adoption of rules, assignment of the additional Zip Code numbers and initial acquisition of OCR equipment by early in 1981. By 1983, the Postal Service expects the transition to the system to be complete.

One of the weaknesses in the existing system of distributing mail, according to Bolger, is that the areas served by letter carriers are often changing as new homes are built and mail volume increases. With changes, postal distribution clerks have to relearn the streets and house numbers served by a specific carrier route.

Initially, the primary users of the nine-digit Zip Code will be business mailers, customers who generate large volumes of computer-printed addresses and distribute preprinted reply envelopes.

Conference Scheduled for Oct. 16-19

Info '78 to Stress Future Management Strategy

By Tim Scannell
CW Staff

CHICAGO — The manager of tomorrow, like the mythical wizard in the rainbow city of Oz, must be all-knowing and all-seeing — or ultimately face the ruin of his corporate kingdom.

Consequently, how well an executive uses information in the 1980s will dictate whether a company's army of machines and computers act beneficially or as juggernauts, crushing both profit and productivity, according to William Reidy, executive vice-president of technical services for Kraft, Inc.

Reidy and nearly 200 other speakers from industry and government are scheduled to address the problems and strategies of information management at the upcoming Info '78 Exposition and Conference. The four-day meeting, slated for Oct. 16-19 here at McCormick Place, is expected to draw more than 15,000 participants.

DP management and, specifically, a manager's role in the information-dependent corporate world of the 1980s will be one of the many areas focused on during the conference.

"First of all, a manager must have a good grounding in the information systems technology," Reidy emphasized. "He must also place himself above that and really understand the key factors in making a business operate more productively."

Flood of Information

Alluding to his conference topic, "New Opportunities for the DP Manager," Reidy stressed the manager's increasingly difficult job in keeping his head above the rising flood of technical information.

"Understanding what makes a business operate and why it has been successful in the past is crucial," Reidy said. "The manager has to understand where in the business are the areas of sensitivity that will contribute" and he must strive to "go beyond the normal kinds of things we've done with computers in the past."

The key to managing a complex organization, Reidy continued, is information. "In the past, organizations have followed communications or information lines. But as we operate in a more and more complex world of the future, the ability to adapt corporations within these lines will rely more heavily on a manager's ability to conform the information or communications channels to meet changing needs."

Another scheduled speaker at the conference — John Reece, vice-president of Booz Allen & Hamilton — believes information goes beyond being simply a key and is, in reality, a tool.

The 1980s may be the first decade "that we will enter as information professionals where the technology is probably measurably ahead of our ability to use and apply the [informational] tool."

In the past, Reece observed, corporations were always concerned with getting a bigger or faster disk drive or a cheaper, more powerful mainframe. "Those things are still important," he noted, "but I think they are now secondary to the issue of how we get the [informational] tool to work and how we get top management and operations to use it effectively."

Reece and his colleague, Michael McLaughlin, an associate with Booz Allen & Hamilton, see the 1980s as the "window" to the dawning of the informational age. In their speech at the conference, they will investigate information's impact on corporate productivity and performance.

"Most of us think of productivity in terms of the number of keystrokes [a person] makes every day," Reece stated. "But the true entrepreneurial vice-president's world is a whole lot bigger than that."

The information function in the 1980s, McLaughlin remarked, will directly affect productivity in three key areas: human resources, capital resources and the use of natural resources. "I don't think there's any doubt in our minds that if we don't do anything [structurally] in this country as we move from an industrial society to an information society, our competitiveness will be shot to hell," he said.

Other Sessions

Info '78 will also include sessions on trends in computer architecture and planning for disaster recovery as well as meetings on DP auditing, minicomputer systems and data base administration, a conference spokesman pointed out. The conference theme, "Strategic Planning in the Information Age," will cover DP, micrographics, word processing systems, electronic mail, records storage and retrieval and office automation.

Registration fees for Info '78 are $225 for the full four days, $80 for one day and $45 for a half-day. Further information on the conference can be obtained from its sponsor, Clapp & Poliak, Inc., 245 Park Ave., New York, N.Y. 10017.

Since hotel space is limited, those interested in Chicago accommodations are advised to make reservations through Info '78's Housing Bureau, c/o Chicago Convention and Tourism Bureau, 332 S. Michigan Ave., Chicago, Ill. 60604.

To COBOL programmers who want to enjoy their work more

Should you enjoy your work? I think so. And programming has the potential to let you enjoy it. It can be challenging, exciting, at times just plain fun. But all too often, it's anything but enjoyable.

Perhaps you've been there. You're already a month behind schedule. You've taken six test runs trying to find the cause of just one bug and you're no closer to a solution. Your flowchart documentation hasn't been brought up-to-date so it no longer represents your coding. And now there's a specification change, just a minor user change but one that plays havoc with your program logic.

No, programming under those conditions isn't fun. It's disturbing, discouraging, sometimes frustrating to the point of tears. But it doesn't have to be that way.

A partial solution

Quite frankly, I don't think anyone can remove all of the frustrations of programming. No matter how well your shop is run, there are going to be system problems that confound your test runs for days at a time. There are going to be schedules, often unreasonable ones. And there are going to be late specification changes. You can't change these conditions, but you can change the way they affect your work.

Our solution is a better system of program development. By properly designing your programs, even major changes in program specifications will have only minor effects on your programs. By adopting more effective methods of program documentation (the flowchart is dead), you will have less trouble with program maintenance. By using better methods of design, coding, and testing, you will have fewer bugs when you start testing and they will be easier to find and correct. And by having better control over all phases of program development, from design to testing, you will have less chance of getting behind schedule.

If you're interested in a better system of program development, I'd like to recommend a couple of books by Paul Noll, a software specialist and training manager. Paul is one of the top COBOL experts in the country, and he has some unique ideas about program development. After experimenting for several years with the latest programming techniques—the ones associated with structured programming—Paul decided that no one had developed a practical way to implement them. So he developed his own methods. His methods are now presented in two books written specifically for the experienced COBOL programmer.

What the books do

The first book, *Structured Programming for the COBOL Programmer*, presents a complete system for developing COBOL programs. It includes top-down design, structured module documentation, structured coding, and top-down testing. To use Paul's methods, you won't have to learn a new vocabulary and you won't be overwhelmed by theory. On the contrary, I think you'll be delighted by the straight forward simplicity of Paul's methods.

The second book, *The Structured Programming Cookbook*, is a reference manual for the development of new programs. It gives standards and guidelines for all phases of structured program development. And it gives complete design, documentation, and coding for four programs that represent the four major classes of business problems. These programs are intended to cut down the repetition in your programming efforts. When you develop an update program, for example, I think you'll find that you can use the structure chart, some module documentation, and even some of the COBOL code from the model update program in the cookbook. This frees you from the tedious aspects of program development and lets you concentrate on the more challenging aspects.

If you are already developing structured programs, I'm convinced that Paul's books can help you to improve your methods so you'll enjoy your work more. And if you haven't yet been introduced to structured programming, you've got some exciting reading ahead of you. I think Paul can show you how to minimize the frustrations of programming while you maximize its challenges.

What other programmers think

Here are some excerpts from letters we've received from programmers throughout the country.

"After reading your books for two hours, I was convinced that I never knew how to write a good COBOL program, and I promptly became a convert."

"The first thing I've seen that was really useful for the COBOL programmer who wants to write structured code."

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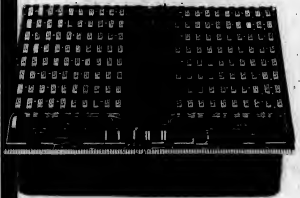

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Students Help County Out of Inventory Bind

By Ann Dooley
CW Staff

LANCASTER, Pa. — Faced with indefinitely postponing development of a much-needed automated inventory control system because of a tight budget and limited staff, the Lancaster County DP center took a chance on an overlooked resource — student DPers from a nearby college. And the gamble worked.

"I'd still be sitting doing pen-and-ink logging on a system hopelessly outdated if it weren't for those students," James Burie, county purchasing agent, admitted.

Burie decided it was time to do away with the outdated inventory record system when the purchasing department moved to new offices last year. With no apparent means of accomplishing the goal, he discussed his problem with colleagues and realized that qualified help — computer science students studying at nearby Millersville State College — was close at hand.

Thomas Houser, director of computer sciences at Millersville, was enthusiastic about the idea since it would be a chance for his students to obtain business experience, so he took the proposal to the school's class in business systems analysis and found four volunteers.

Since there was no money in the budget to pay outside programmers, this was the perfect solution, according to Burie. The inventory system had been sorely needed for a long time but there had just never been enough time to develop it, he noted.

Savings of $6,000

And instead of putting an additional strain on the budget, the student programmers saved the country an estimated $6,000 in programmer and machine time. The system still saves staff time every time it's put to use, Burie pointed out.

Before the students began work, Burie hired a part-time employee to identify and catalog all county office equipment worth more than $25. This included anything from furniture to water coolers and amounted to more than 10,000 separate items, he said.

The raw data, along with an outline of the county's needs and requirements, was turned over to the students, who then took over and set up the program. They spent about four months on the project, working in their free time and even during vacations, according to Burie.

The students used the college's Univac 70/3 to develop the program and subsequently converted it to run on the county's Univac 90/30. The conversion was fairly easy since the volunteers were familiar with the county's DP equipment and the systems were compatible.

The foursome spent their last two weeks on the project at the county DP center, testing and debugging the program to make sure it would run on the 90/30 without any problems.

Although the students weren't paid, they received a grade and credits for the project. All four were "really great to work with," according to Burie, who added that one of the students came in on his summer break to work on the project.

All were enthusiastic and "kept me on my toes," he said.

Fresh Approach

In many ways, those students were more qualified than some working DPers since everything was fresh in their minds, he noted. They were also closely supervised by their professor, who allowed them to make mistakes but made sure they corrected any problems.

All the work was done exactly by the book, he added.

Burie hopes to work on other projects with students from Millersville. One task he has in mind is automating the purchasing operation to avoid duplication in buying and to reduce the workload.

From the students' point of view, the project was a real learning experience — much better than textbooks, they all agreed.

"I enjoyed getting involved," Bruce Miller, one of the programmers said, adding "there were some headaches, but the end result was that it really worked, which gave us all a lot of satisfaction." It was also worthwhile working on a business application rather than a purely academic system.

With the new system, it is now possible to "have a finger" on all the equipment at any location in the county, Burie said. When a new official moves into an office, "we can now tell exactly what should be in that office. This way we have some control over the equipment," he noted.

It is also possible to move equipment around where it is needed and thus avoid duplicate purchases, he said.

Lancaster County's system includes the 90/30 with 190K of memory, two tape drives, four disk drives, several keypunch machines and a Univac 0773 printer.

The system is also used to keep tabs on bench warrants and concealed weapons for the sheriff's office, to prepare budgets and to provide records for the Children's Bureau and the County Home for the Aged. It also handles fines; voter registration lists; interim taxes; jury selection; county payroll; and personal property, real estate and school taxes.

'Solutions' Gets Info Price Cut

DELRAN, N.J. — "Datapro Automated Office Solutions," a monthly series of reports and newsletters published by Datapro Research Corp., will be offered at a reduced price to participants at the Info '78 conference and exhibit scheduled to take place in Chicago Oct. 16-19. (See Page 9).

The service, consisting of two loose-leaf volumes of reports, Datapro's monthly Automated Office Newsbriefs and use of the firm's telephone inquiry service, will be available for $230 — $60 less than the regular $290 subscription rate, according to a Datapro spokesman.

Additional information can be obtained from Datapro at 1805 Underwood Blvd., Delran, N.J. 08075.

Contract Work Starts

DOD Expects Standard Compiler by 1981

By Robert L. Glass
Special to CW

FT. WALTON BEACH, Fla. — The people who brought you Cobol took a giant step toward a common standard Department of Defense (DOD) programming language with the recent announcement that work has begun on a contract for the language compiler. The finished product is expected by May 1981.

The announcement was made by Martin Wolfe, who represented the U.S. Army at a workshop on a standard compiler for the DOD language at Eglin Air Force Base here recently.

The contract announcement came as a surprise to many of the workshop attendees. Although the deadline for definition of the compiler had been set for April, 1979 for some time, with the Army contract award scheduled for the following month, most participants here had been taking a "wait-and-see" attitude toward the actual use of the language. The Army's action added a touch of reality and immediacy to the project, attendees agreed.

An additional surprise to attendees was the news that the Army plans to implement the language on a Digital Equipment Corp. PDP 11-70 and that it will be compatible with the AT&T Unix operating system and Programmer's Workbench. Implementing a major language on a minicomputer is especially difficult.

Application Areas

The DOD language was specifically designed for embedded computer system applications — those where the computer and its software are part of some large system, like a spacecraft or weapons system. But its applicability is expected to extend into the areas served by all current standard programming languages except Cobol.

Indeed, it is expected to replace the seven standard languages now in use by the various departments of the armed service, except for Cobol and Fortran. Those include the Air Force's Jovial J3 and Jovial J73, the Navy's CMS-2 and SPL-1 and the Army's Tacpol, according to Lt. Col. William A. Whitaker, who represented the DOD team responsible for defining the language.

Its capabilities — based as it is on the scientific system-oriented language, Pascal — could even result in its being used in Fortran's place, but the goal of the language, according to Whitaker, is to promote the portability of application and tool software across computer lines, across project lines and among the three services.

The language is currently in a design phase with Intermetrics and CII-Honeywell Bull producing competitive language definitions, including a pilot implementation. A decision on the language and the beginning of the standardization process will be made next April.

The means by which DOD will enforce the standardization effort is as yet unclear. When DOD standardized on Cobol about 20 years ago, it required all manufacturers of equipment entering the DOD inventory to have available a Cobol compiler.

This action more than any other triggered the near-universal acceptance of Cobol as *the* business-oriented language, most DP industry observers agreed. Use of this approach to enforce the latest language, however, has not yet been discussed as a probability at any of the language workshops.

The emergence of the language is not without controversy. Prof. Edsger W. Dijkstra, a leader in the field of computing software technology, published a highly critical article on the current preliminary definition of the language in the July 1978 *Sigplan Notices*, a monthly publication of the Association for Computing Machinery's (ACM) Special Interest Group on Programming Languages.

Dijkstra charged that competition for the language resulted in focus on vendor sales efforts rather than on language technology and that language designers were too compliant with the requirements.

"I am pretty sure the new language-if it ever gets designed at all — will be much, much worse than Pascal if they proceed in this fashion," Dijkstra said.

However, Dijkstra himself has been embroiled in controversy during recent months. His attack on a paper about software proof of correctness was published in the April 1978 *Software Engineering Notes*. *Notes* is a quarterly publication of the ACM's Special Interest Group on Software Engineering.

The attack charged three other software technologists with writing a "political pamphlet from the Middle Ages" and "a very ugly paper." The paper had taken the position that software proof of correctness is unlikely to bear fruit because it does not incorporate the elaborate social processes that mathematical proof of correctness utilizes.

Controversy aside, there appears to be little doubt the language and compiler work will in fact be completed close to the schedule arranged by Whitaker. However, one aspect of the language's implementation *has* fallen behind schedule. A name for the language still has not been selected.

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GAO Blames Federal Agencies

Contractors Found Ignorant of Privacy Act

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Private contractors that maintain personal records for the federal government generally are ignorant of their responsibilities under the 1974 Privacy Act, a General Accounting Office (GAO) spokesman said here recently.

Testifying recently before the House Subcommittee on Government Information and Individual Rights, Donald L. Eirich, associate director of the GAO Logistics and Communications Division, said that although most contractors are aware of the need to keep personal information confidential, the potential for abuse of individual rights does exist.

Eirich made these remarks as he explained the results of a GAO investigation of private contractors' compliance with the Privacy Act. The investigation was requested by Subcommitee Chairman Richardson Preyer (D-N.C.).

The study found that contractors essentially "are not doing anything different from before [the act was passed]," according to Eirich.

The primary reason they aren't, he said, is that the federal agencies contracting for the services often don't require private companies to comply with the act because the agencies don't understand the law's requirements in the contracting area.

In addition, he said, the GAO found many private contractors simply are not aware that the work they do for the government might in any way be covered by the act.

Subsection 3(m) of the Privacy Act provides that if a private contractor maintains records on behalf of a federal agency, those records come under the rules and procedures established by the act.

The act, in effect since September 1975, gives each person the right to (1) know what government records on him are collected and maintained; (2) have access to his records and be able to amend or correct them; and (3) prevent information obtained by the government for a specific purpose from being disclosed for another purpose without his consent.

Scope of Review

The GAO's review involved various offices of 10 federal departments and agencies and about 60 contractors. According to Eirich, the review centered on the Veterans Administration, the Department of Health, Education and Welfare and the Department of Housing and Urban Development.

Contractors for these agencies, he said, might, for example, maintain rent-subsidized housing and have information on tenants, or be insurance companies that have information on persons receiving Medicare or Medicaid benefits. The majority of such records, he noted, are to some extent automated.

The problem of private contractors' noncompliance with the Privacy Act has arisen because government agencies are not making it clear to their contractors what their responsibilities are, the GAO found. Contracts rarely even mention the Privacy Act because "the exact applicability of the subsection remains unclear within many federal offices," according to Eirich.

Office of Management and Budget (OMB) guidelines for example, clearly state that systems actually taking the place of those the federal government would have set up itself if not for the contract are covered by the act. However, many of the government's procurement regulations differ from the OMB guidelines, he said.

Eirich explained that the Federal Procurement Regulations (FPR) drawn up by the General Services Administration Postal Service procurement regulations and the Armed Services Procurements Regulations (ASPR) all state that when a federal procurement comes under the provisions of the Privacy Act, the contract should say so specifically. But the OMB guidelines provide that contractors might sometimes be subject to the act even if a system of records cannot be specifically identified when the contract is awarded, he said.

Personnel Training Lacking

GAO found government contracting personnel have, on the whole, had little formal training in the Privacy Act, Eirich told the subcommittee.

The agencies and contractors reviewed paid little attention to implementing Subsection 3(m), he said, because agency officials sometimes had difficulty deciding which contracts should be subject to the act. And even when they considered the law applicable, most agencies did not monitor the contractors for compliance.

Further, when a specific Privacy Act clause was in a contract, the contractor generally did little if anything new, the GAO found, because it was not familiar with the act's requirements.

With rare exceptions, agencies "simply have not monitored contractors' Privacy Act compliance," according to Eirich. The main reasons given, he said, were lack of agency resources and the fact that few, if any, alleged abuses of personal privacy involving private contractors have surfaced.

According to many government contracting officials the GAO found, there is no need to closely monitor Privacy Act compliance, because prior practices assured them that personal information would be kept confidential and secure by the outside contractor.

For example, Girich said, representatives of the medical profession told the GAO their long-standing practices were to treat patient information confidentially, and several corporations noted they normally process sensitive data, such as bank records, for nonfederal clients whose business they could not solicit and retain without assurance of confidentiality and security.

All this notwithstanding, Eirich pointed out that great harm could be done. Not only is it very possible that a contractor would not be willing or able to give individuals the access to their government records the Privacy Act requires, but "some of the types of records contractors handle, such as credit information, have direct commercial value," he said.

In addition, a mailing list audience could exist for other record systems, such as these containing names of military personnel, older citizens or students — depending upon what a commercial firm may be selling or promoting, he added.

GAO Recommendations

Eirich said the GAO would put forward recommendations to remedy the noncompliance problem. To correct the situation, he said, OMB should:

- Improve its guidelines to help agencies decide which contracts should be covered by the Privacy Act.
- Encourage the Civil Service Commission and agencies to include better coverage of Subsection 3(m) in Privacy Act training programs.
- Review and clarify procurement regulations to assure contractors are aware of what information is subject to the act's requirements.
- Reemphasize its existing guidance

(Continued on Page 13)

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Chamber of Commerce Adopts Privacy Policy

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. – The National Chamber of Commerce recently adopted a revised privacy policy calling for businesses to voluntarily implement safeguards and controls over personal information collected in the course of doing business.

The policy statement, revised in the wake of the 1977 final report of the Privacy Protection Study Commission, was developed over a 10-month period by the chamber's 22-member panel on privacy.

The statement noted that the scope of citizens' rights to privacy regarding personal information about them collected or used by business and government "has become more clearly defined in both the public and private sectors, through research, legislative, judicial and voluntary actions."

The chamber said it supports "voluntary programs by business as the primary means to assure and protect individual rights in business and professional transactions." The following three "basic objectives" were put forward for "an effective privacy protection policy:"

- To minimize intrusiveness by creating proper balance between what an individual is expected to divulge to a recordkeeping organization and what is sought in return.
- To maximize fairness by opening up recordkeeping organizations in ways that will minimize the extent to which recorded information about an individual is itself a source of unfairness in any direction made on the basis of the data.
- To create "legitimate and enforceable expectations of confidentiality" by creating and defining obligations regarding the uses and disclosures that will be made of recorded information about an individual.

Robert M. Hawk, director of the National Chamber's Community and Regional Development Section, said the policy statement is "necessarily general" because of the size and diversity of the Chamber of Commerce.

Hawk added that the group will be developing educational material and may hold regional seminars to "raise the consciousness of business on privacy issues." The National Chamber represents more than 77,000 businesses nationwide, about 85% of which employ less than 100 people, in about 1,200 local and state chambers of commerce.

Security Seminar Slated

PHOENIX – Honeywell, Inc.'s fifth national Computer Security and Privacy Symposium, "Top Secrets '79," will be held here April 2-3, 1979.

The symposium's purpose is to share the company's increasing knowledge and experience in computer systems security and privacy, according to Jerome Lobel, Honeywell's manager of computer security and privacy.

The symposium registration fee is $450, and a $50 discount is given if payment is received at least 30 days before the symposium's opening.

A team discount of an additional $25 per person for groups of two or more from the same organization is also available if the preregistration and payment are received 30 days in advance.

The symposium will be held at the Registry Resort in Scottsdale, Ariz. Registration forms and additional information may be obtained from Jerome Lobel at Honeywell, Inc., P.O. Box 6000, Phoenix, Ariz. 85005.

Contractors Not Aware of Law

(Continued from Page 12)

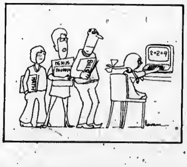
to agencies that all contracts be reviewed for possible applicability of the act.

- Direct agencies to acquaint contractors, through training programs or written reminders, of the act's requirements.
- Require agencies to establish an appropriate method of monitoring contractors' compliance with the act.

Eirich said the GAO will give the subcommittee its final report on the investigation in about 30 days. The GAO is presently looking for any evidence of abuse of personal information maintained by private contractors.

He noted that subcommittee member Paul N. McCloskey Jr. (R-Calif.) said during the hearing that it does not make sense for the government to monitor private contractors more closely if there is no evidence of abuse.

Evidently, Eirich said, McCloskey agrees with the contention of private industry that there is no need of closer monitoring because of the "tradition of privacy in these areas."



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Calendar

Oct. 30-Nov. 1, San Diego, Calif. — **Data Entry Management Association (Dema) Second Annual Conference.** Contact: Dema, 16E Weavers Hill, Greenwich, Conn. 06830.

Oct. 31-Nov. 2, Seattle — **National Micrographics Association (NMA) Midyear Meeting.** Contact: NMA Conference Department, Suite 1101, 8728 Colesville Road, Silver Spring, Md. 20910.

Nov. 1-2 Dallas — **How to Select and Implement an Interconnect System,** sponsored by *Business Communications Review.* Contact: *Business Communications Review,* 36 S. Washington St., Hinsdale, Ill. 60521. Also being held in San Francisco, Nov. 16-17, and in Chicago, Nov. 29-30.

Nov. 1-2, Washington, D.C. — **How to Build and Use a Data Resource Directory,** sponsored by Data Resource Management Associates. Contact: Arnold Barnett, Data Resource Management Associates, 19 Orchard Way North, Rockville, Md. 20854.

Nov. 1-2, New York — **Data Administration/Data Dictionary,** sponsored by Performance Development Corp. (PDC). Contact: PDC, 1101 State Road, Building M, Princeton, N.J. 08540. Also being held in Houston, Nov. 15-16.

Nov. 1-3, Toronto — **CEC '78, Computers, Electronics and Control Fourth International Symposium,** sponsored by the International Association of Science and Technology for Development (Iasted); Toronto Chapter, The Institute of Electrical and Electronics Engineers (IEEE); Toronto Chapter, Canadian Society of Electrical Engineers (CSEE); and Toronto Chapter, Canadian Information Processing Society (Cips). Contact: K.C. Smith, Program Chairman, CEC '78, University of Toronto, Department of Electrical Engineering, Toronto, Ontario, Canada M5S 1A4.

Nov. 1-3, Orlando, Fla. — The Association of Data Processing Service Organizations' (Adapso) 49th Management Conference and 18th Annual Meeting, **The Growing Resource for Business: The Computer Services Industry.** Contact: Adapso, 210 Summit Ave., Montvale, N.J. 07645.

Nov. 1-3, Chicago — **User Conference,** sponsored by Computer Management Association, Inc. & Midwest Honeywell User Group. Contact: Registrar, Jack Cook, National Family Opinion, Box 315, Toledo, Ohio 43691.

Nov. 2, New York — **Telephone Traffic Engineering for the Business User,** sponsored by *Business Communications Review.* Contact: *Business Communications Review,* 36 S. Washington St., Hinsdale, Ill. 60521.

Nov. 2-3, New York — **Data Communications: Advanced Concepts and Systems,** sponsored by Datapro Research Corp. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 5-9, Washington, D.C. — **Second Annual Symposium on Computer Applications in Medical Care.** Contact: Helmuth Orthner, George Washington University, Department of Clinical Engineering, 2300 K St. N.W., Washington, D.C. 20037.

Nov. 6-8, San Francisco — **Computer Performance Measurement, Tools and Techniques for Increased System Productivity,** sponsored by Datapro Research Corp. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held in New York, Nov. 15-17.

Nov. 6-8, New York — **Computer Contract Negotiations Seminar,** sponsored by Brandon Consulting Group, Inc. Contact: Ruth K. Dargis, Brandon Consulting Group, Inc., 505 Park Ave., New York, N.Y. 10022.

Nov. 6-8, Pittsburgh, Pa. — **The Structure and Governance of Library Networks,** sponsored by National Commission on Libraries and Information Sciences and Graduate School of Library and Information Sciences. Contact: Graduate School of Library and Information Sciences, University of Pittsburgh, 801 L.I.S. Building, Pittsburgh, Pa. 15260.

Nov. 7-9, Washington, D.C. — **Federal Computer Conference,** cosponsored by *Datamation* magazine and Federal Education Programs. Contact: Federal Computer Conference, P.O. Box 368, Wayland, Mass. 01778.

Nov. 7-9, Houston — **Minicomputer/Microcomputer Conference and Exposition.** Contact: Mini/Micro, Suite 1, 5528 E. La Palma Ave., Anaheim, Calif. 92807.

Nov. 7-9, Dallas — **Seventh Annual Meeting of Computer-Aided Manufacturing International, Inc.** Contact: C.H. Link, Computer-Aided Manufacturing International, Inc., Suite 1107, 611 Ryan Plaza Drive, Arlington, Texas 76011.

Nov. 8, London — **Compec UK,** sponsored by *Computer Weekly* and *Data Processing.* Contact: IPC Business Press Ltd., Surrey House, Throwley Way, Sutton Surrey SMI 4QQ, London, England.

Nov. 8, Philadelphia — **Telecommunications Update '78,** sponsored by *Business Communications Review.* Contact: *Business Communications Review,* 36 S. Washington St., Hinsdale, Ill, 60521. Also being held Nov. 9, Boston; Nov. 14, Los Angeles; Nov. 15, San Francisco; and Nov. 28, Chicago.

Nov. 8-9, Chicago — **Understanding Modern PBX Systems,** sponsored by *Business Communications Review.* Contact: *Business Communicatiosn Review,* 36 S. Washington St., Hinsdale, Ill. 60521. Also being held in Washingon, D.C., Nov. 29-30.

Nov. 8-9, Houston — **Software Cost Estimating,** sponsored by Technical Marketing Society of America (TMSA). Contact: TMSA Conferences, P.O. Box 91295, Los Angeles, Calif. 90009.

Nov. 8-10, San Francisco — **Data Base Management Systems: A Comparative Analysis,** sponsored by Datapro Research Corp. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held in Washington, D.C., Nov. 13-15.

Nov. 8-10, San Francisco — **EDP Project Management: A Practical Approach,** sponsored by Datapro Research Corp. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held in Washington, D.C., Nov. 13-15, and in New York, Nov. 27-29.

Nov. 13-17, Washington, D.C. — **Systems Analysis Workshop,** sponsored by Brandon Systems Institute. Contact: Brandon Systems Institute, 4720 Montgomery Lane, Bethesda, Md. 20014.

Nov. 14-16, Washington, D.C. — **Educom Fall Conference and Annual Meeting.** Contact: Carol Parysz, Educom, P.O. 364, Princeton, N.J. 08540.

Nov. 15, Washington, D.C. — **North American Telephone Association Annual Convention.** Contact: Joe Heeney, North American Telephone Association, 1030 15th St. N.W., Washington, D.C. 20005.

Nov. 15, Toronto — **Building Creditability Into the Organization,** sponsored by the Association for Systems Management (ASM). Contact: ASM, Suite 600, 55 University Ave., Toronto, Ontario, M5J 2H7, Canada.

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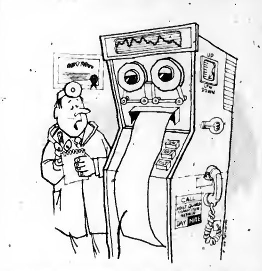

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UD Seeks Women for One-Year Free Program

DAYTON, Ohio — Women with science or computer science backgrounds are being sought by the University of Dayton (UD) to participate in a one-year, tuition-paid program to become electrical or chemical engineers.

The program begins Jan. 8 and the application deadline is Oct. 10, but late applications will be considered if openings exist, a UD spokeswoman said.

Called Fast-Track II, the program is funded by a $178,000 grant from the National Science Foundation (NSF). It is one of several programs sponsored by NSF's Women in Science Program and mandated by Congress to increase the number of women in science and engineering, an NSF spokeswoman said.

At present, "women are underrepresented in the fields of science and engineering," she explained. "Women make up 51% of the population and yet less than 10% are employed as scientists or engineers."

This program is aimed at changing that percentage. Fast-Track II is being offered because the prototype program offered in 1976-77 was very successful, according to Carol M. Shaw, assistant dean of engineering for special programs and continuing education at UD and project director for the program.

"Women completing Fast-Track I were eagerly sought by industries across the country," she said. "A number of women were offered management training programs with Fortune 500 companies. Several women had up to seven job offers and received salaries that were $10,000 greater than what they had previously earned."

A special feature of the program is an initial one-week session devoted to motivation, diagnosis and counseling in preparation for the work of the ensuing year. A professional development course will be offered to support the participants' self-concepts as professional engineers.

Full academic credit will be awarded for all courses taken in the Fast-Track program. Options are available in either chemical or electrical engineering. The program also satisfies all of the UD School of Engineering requirements for a second degree, according to UD.

Students will attend the program full-time from January to December 14, 1979, and take 12 hours of courses in each of three terms: Jan. 16-April 27, May 3-July 27 and Aug. 27-Dec. 14. Self-paced instruction as well as traditional lectures will comprise the courses.

Participants interested in applying for the program should contact Shaw at the University of Dayton, Dayton, Ohio 45469.

USC, Opec Join To Devise Model Of World Energy

LOS ANGELES — The University of Southern California (USC) and the Organization of Petroleum Exporting Countries (Opec) have joined forces to develop a computer-based modeling system that will help project and analyze the future of the world's major energy resources.

USC faculty members, with the advice and guidance of a council of experts representing the U.S., Europe and Canada, will examine such factors as global energy supplies, demand and costs; transformation and transportation costs; and alternate pricing strategies.

The system is scheduled for completion in mid-1980.

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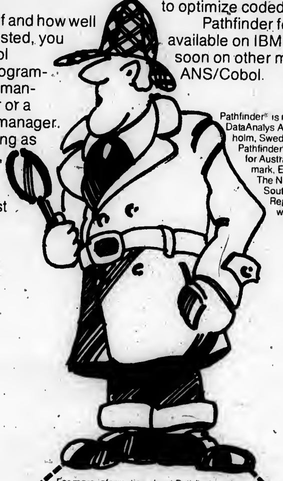

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Guide to DP Executives Ready

PHOENIX – The fall 1978 edition of *The Directory of Top Computer Executives* is now available from Applied Computer Research (ACR) here.

The directory contains the names, addresses and telephone numbers of more than 6,000 of the nation's top computer executives. It includes the manufacturers and model numbers of the computers in their DP centers.

The book is priced at $75 for a single copy with additional copies available at $45 each. The annual subscription price, which covers two semiannual issues, is $120.

Mailing labels are also available from ACR at P.O. Box 9280, Phoenix, Ariz. 86068.

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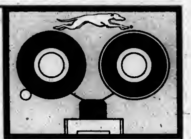

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World Bank Group's Report Suggests Ways to Secure Computer Installations

By Ann Dooley
CW Staff

NEW YORK – Security for a computer installation is effective only if protection is provided at an obtainable level and at a realistic cost. If security measures are not practical and easy to use, they may not be enforced, according to a report on security and reliability for electronic payment systems.

The report, written as a guide for developing, operating and controlling computer installations at banks, was prepared by DP specialists from the central banks of the Group of Ten, an international financial group whose guidelines can be applied to most installations. The Group of Ten includes Canada, France, West Germany, Italy, the UK, the U.S., Sweden, Japan, The Netherlands and Belgium.

The group found use of electronic systems for payments is growing rapidly because financial institutions need to minimize the repetition involved in funds transfer and speed the transfer process, as well as reduce costs and increase reliability. But the report discovered such rapid growth could result in increased improper usage of these systems.

The Group of Ten also found that as technical knowledge and equipment have become more commonplace, a larger number of people can misuse an automated system. In addition, violations of confidence and privacy may harm the system, beyond any direct financial loss involved to the company.

Staff Security

Although no system can be made completely secure, the Group of Ten indicated more attention must be paid to the development of adequate security procedures.

A secure system should ensure proper authorization of transactions before they are entered at an input station. Delivery should be made to the correct output station with the same content that was entered. A secure system also must ensure that unauthorized persons cannot learn the transactions or delay the transmission, the report indicated.

The total protection provided by a security system is related to the level of effective protection at each of its separate points. The risk of violation is highest at the input and output stages and lowest at the electronic processing phase, although that is where the more serious effects can occur, the report indicated.

The large number of input and output stations provide a greater opportunity for potential violators, and compromise at these points is far easier than at the electronic transmission or processing level, the report indicated.

A security system is the responsibility of senior management at each user station and those who operate and control the system network. It is the duty of senior management to ensure user security, effective process controls, tight physical restriction and a comprehensive audit program, the report said.

Senior management should also see that staff members are properly screened and trained since many "trusted insiders" are common system abusers, according to the report. Staff duties should be rotated without warning and certain areas should be restricted.

Employees in sensitive operational and support areas should be made aware of the security policy and should be informed that violations could lead to dismissal or prosecution.

Physical Security

Apart from staff security, the report indicated ways to promote physical security such as the choice of a building location with an eye to weather conditions, proximity of strong electrical fields, accessibility of supplies such as communication facilities and power and the availability of emergency services. The computer room should not be "on display" or have outside windows or signposts to the installation.

Access to the installation should be controlled by guards, passes, identity checks, sign-in/sign-out procedures, escorts for visitors, limited entry facilities, locks or a combination of these approaches.

Storage facilities for disks, tapes, data files, program listings and other vital data should be physically separated from the computers and undergo the same kind of security checks, according to the report.

Emergency Plans

A plan for providing emergency energy supplies, as well as fire precautions, should be of top priority. Attention should also be focused on basic physical components such as equipment reliability, computer system design and software structure.

The central computer system should have a degree of built-in redundancy as well as back-up connections. Mainframes can be duplicated or interconnected on a "shared-load" basis to guarantee continuous operation.

In addition, in case of any fault in either the hardware or the software, system software should permit a full recovery.

Network reliability can be ensured by providing two contingency circuits between telecommunications facilities, the report indicated. In addition, two sets of transmission lines following different routes should be installed between the center and the first node of the phone network.

Telecommunications Dangers

The main dangers in the area of telecommunications lie in unauthorized monitoring or insertion of false messages, according to the report.

If unlawful access to a terminal has occurred, the report signified the next level of security must be to prevent operational access to the system. These precautions can include computer-controlled terminals, stringent sign-on/sign-off procedures, computer verification of operator identity and input and output message control.

Message control, authorization and validation should also be implemented and enforced, the report said.

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Aetna's Sitkin Named DPMA Man of the Year

PARK RIDGE, IL. — Irwin J. Sitkin, vice-president of corporate data processing and administrative services for Aetna Life & Casualty Co. in Hartford, Conn., has been selected as the Data Processing Management Association (DPMA) Computer Sciences Man of the Year for 1978.

The annual international award, established in 1968, is given in recognition of outstanding contributions to the DP field.

The council said the selection reflects the current trend in the DP field of special emphasis on DP as an integral part of a business operation, as well as an important management discipline.

The 1978 award will be presented to Sitkin during DPMA's New Orleans '78 international conference, which will be held Oct. 29-Nov. 1.

Irwin J. Sitkin

Sitkin manages Aetna's DP and administrative services functions, which call for an annual budget of $63 million, including DP equipment renting for $17.2 million. He supervises a 2,000-person staff in one of the major DP installations in the U.S.

A graduate of Cornell University with a bachelor of science degree in economics, Sitkin joined Aetna in 1956 as a programmer/systems analyst. He was named a superintendent in 1958, assistant secretary in 1960.

After several other promotions, he assumed his present title in 1976.

New South Wales Planning Steps to Curb DP Crime

CW Australasian News Bureau

SYDNEY — A four-point plan to fight computer-related crime has been proposed by New South Wales (NSW) Attorney General Frank Walker following a report on the subject prepared by the state's Corporate Affairs Commission.

The plan calls for the training of special police and company investigators to detect such crimes; stonger laws to enforce closer scrutiny of computer-based company records; changes to the law of evidence to enable computer-related offenses to be proved more easily; and closer liaison with the computer industry.

Walker said he was convinced much computer-related crime was already being committed in Australia but that its extent was impossible to assess.

Expertise Lacking

"Perhaps our greatest weakness at present is we lack the expertise to detect the cunning and sophisticated plundering that is undoubtedly going on," he said.

He pointed out the rapid expansion of computer technology had outstripped safeguards which might protect the community from computer-related crime.

The report prepared for the Attorney General's department followed an investigation into the subject by Arthur Sindel, research and training director at the NSW Corporate Affairs Commission. During the investigation, Sindel studied firsthand U.S., Canadian and UK programs to counter computer-related crime.

Overseas Liaison

One of the recommendations in Sindel's report was for closer liaison with overseas law enforcement agencies such as the Federal Bureau of Investigation (FBI) and the training of local police on existing installations such as the NSW Institute of Technology.

The report also said computer fraud had rarely been detected by auditing or other conventional means and there was an awareness overseas of the lack of trained investigators.

Sindel recommended that:

- An overseas study tour be made by the NSW Police Department and the Corporate Affairs Commission.
- Local police attend the FBI's academy course on computer crime.
- Basic computer courses be structured for the NSW Police Department.
- Hands-on experience be provided for police at major public- and private-sector installations.
- A liaison with the computer industry be established.
- Law enforcement agencies exert influence toward greater effectiveness in computer security.

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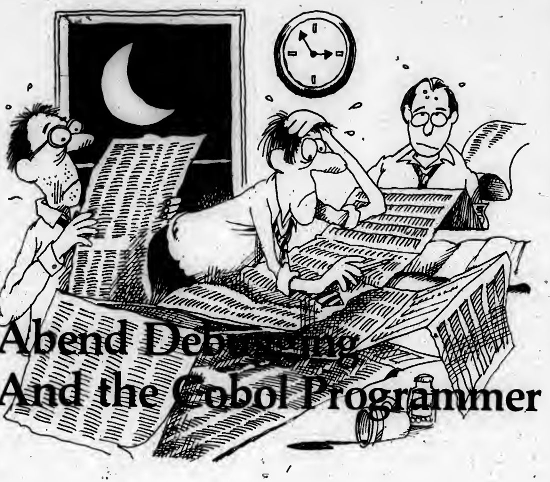

Abend Debugging And the Cobol Programmer

By Bernard H. Boar

Program testing and debugging are the greatest problems confronting the Cobol programmer. Although the testing and debugging of a program are both more difficult and time-consuming than the job of coding it, relatively little time, energy and interest is spent in analyzing how best to perform these complementary tasks.

Common industry practice indicates that testing and debugging (module, program, subsystem, system, acceptance, parallel, release, update, etc.) will consume 33% to 70% of a project's time. While these tasks represent the major cost component of the development or maintenance budget, they are addressed only minimally in both Cobol courses and the professional literature.

A typical training session might consist of eight weeks of instruction on Cobol, JCL, utilities and linkage-editors, with little or no time spent on testing and debugging — which can comprise 70% of the student's job. Similarly, *Computing Newsletter*, a yearly bibliography of DP books for academic instructors, offers more than 50 selections which instruct the reader in "Essentials," "Basics," "Elements of" and "Functions of" Cobol; only four books use the words "Testing" or "Debugging" in their titles.

Program debugging remains a largely ignored area, without the analysis and investigation commensurate with its importance.

Because little formal guidance exists in how to approach, structure and control testing and debugging in general, the situation becomes acute when a programmer is confronted with an Abend dump (IBM OS and OS/VS operating systems). The selection, format and presentation of the dump, a raw machine-level hexadecimal dump of core storage at the time of the program or system logic error, is completely unrelated to the source Cobol program.

This presents both a dilemma and paradox to the programmer. A primary objective of Cobol was to provide a machine-independent and English-like language. High-level programmers would not need to know the intricacies and dynamics of either the operating system or hardware.

Unfortunately, this objective, when implemented, was confined to the input side only. As illustrated in Figure 1 on Page 21, the compiler and linkage-editor convert the familiar Cobol source code into a machine-executable format. If an Abend should occur, however, no reverse (machine-level to source-level) conversion occurs on the output side.

Ill-prepared, the programmer is papered under by pages of hex and storage and system-level control blocks that are all irrelevant to Cobol. Since Cobol is a high-level language, most programmers are not formally trained in how to relate the raw core dump back to the source code and/or JCL.

Yet, the standard debugging aid provided to the programmer when a test or production system fails is a machine-level dump. What, then, is the programmer to do to solve this dilemma?

'Leave Out the Bugs'

A general approach to solving this problem is to avoid the need to debug at the dump level by either writing bug-free programs or by using source-level debugging tools when available. As J.D. Aron of IBM has said, "The best way to write a correct program is to leave out the bugs."

This might seem a bit obvious, but it sums up the thrust of a great deal of current literature related to program design, testing, debugging and development. The goal is to build systems which by their inherent construction will be bug-free. The strategems used — from system conception through implementation to maintenance — will prevent bugs from entering the program code or, at minimum, catch them early in the development cycle.

This philosophy is often summarized under the broad categories of software engineering and programmer productivity techniques (Figure 2 on Page 21). These techniques represent an evolutionary approach to program and system development which will minimize bugs and, consequently, Abends.

Of particular value to the debugging analyst are defensive programming and antidebugging coding. They acknowledge the error-prone nature of program development and provide guidelines for minimizing it.

In spite of the considerable success that comes from using these techniques, programs still Abend. A correctness proof does not yet exist; in the foreseeable future, programmers will still:

- Fail to initialize fields.
- Miss validation checks.
- Subscript (index) incorrectly.
- Invert CALL/ENTRY linkage.
- Leave out or incorrectly insert periods.

Bug-free programs remain an unrealized goal.

(Continued on Page 21)

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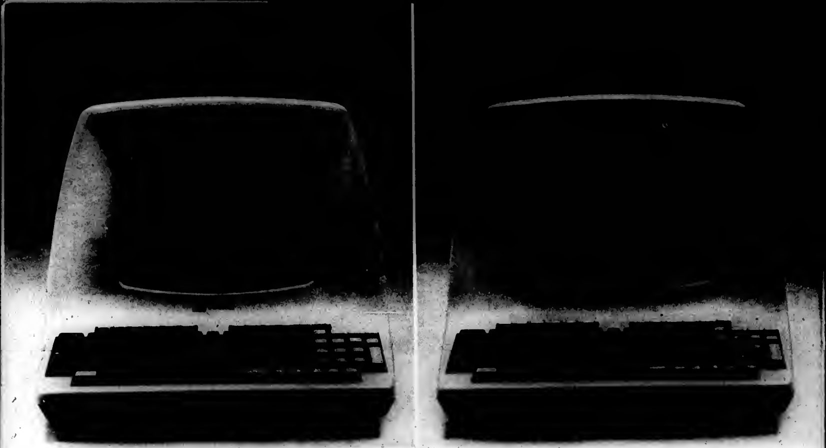

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ABEND DEBUGGING

IN DEPTH

(Continued from Page 19)

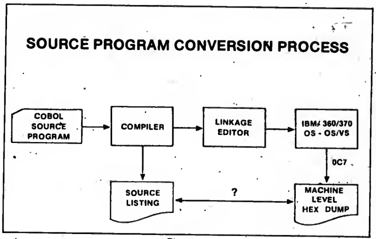

Figure 1

Since Abend debugging cannot be totally eliminated, the programmer requires an effective set of methods and techniques to deal with them. Toward this end, he needs to know how to use the available debugging tools and, of primary concern, he must have a clear understanding of what type of information is required to isolate the cause and solve each occurrence.

Common Abends

The common types of Abends confronting the Cobol programmer can be divided into three classifications:

- Problem program.
- Data management.
- Supervisor.

Problem program Abends are the most prevalent. They signify errors which represent the improper use of data and/or instructions by the program. OC7, OCB and OC4 error messages are frequent in this group.

When confronted with an OCX series Abend, the analyst needs to know the information itemized in Figure 3.

The first three items establish the immediate technical cause of the Abend (e.g., a subscript value exceeds the size of a table). The last three are used to establish the logic failure. They address the flow reconstruction question of "What was the series of events which precipitated the error?"

Data management Abends are the second most prevalent type of Abends confronting the Cobol programmer. They signal an incorrect interface between the program and an Open-Close-End-of-Volume (O/C/EOQ) function.

A common example of this family is a B37, which denotes that space became unavailable while writing to a direct access storage device (DASD). In these cases, the analyst needs to know both the file in error and a clue to the interface malfunction. A B37 could be caused by a variety of events:

- A write-loop which has exceeded the permissible number of extents.
- An excessive output file size, one which has exceeded the permissible number of extents.
- A secondary requested space allocation too large for the available space.
- A lack of secondary space.

The corrective action would be different in each case.

Supervisor Abends encompass all other Abends resulting from an interface error between the program and the operating system. A typical example is an 804, which signifies that insufficient core was requested by the JCL REGION parameter.

The programmer needs to know the actual needed core. With this data, a corrected REGION value can be calculated.

Independent of the Abend category, the data provided to assist in analyzing the error should be in high-level format. Since the programmer's training and experience are in Cobol, any alien format requires new skills to be mastered, many of which would require hardware and operating system knowledge beyond what is customarily expected of an application programmer.

Debugging Tools

There are five categories of debugging tools (Figure 4). Cobol Debugging verbs are part of the Cobol language and as such are immediately understandable to the programmer. As an Abend debugging aid, they have mixed value, as Figure 5 illustrates.

Consider a modular program consisting of 10 modules. If the program were to Abend with an OC7, perhaps nine trial-and-error recompiles and link-edits would be required to isolate the erroneous module, instruction and core data values.

Although this is a possible approach in a test environment, it is not feasible with production Abends.

The impact of these Abends on both operations and the user require them to be fixed as quickly and efficiently as possible. A trial-and-error debugging verb approach would provide neither a satisfactory support level or a satisfactory response level.

Abend Monitors

Abends monitors, developed by numerous software vendors, provide various debugging aids. In general, when a problem program Abend occurs, the monitor intercepts the Abend, prints an edited dump which highlights certain key debugging control data and resumes program execution by reinitializing the erroneous field with a valid numeric value.

The number of Abends so "trapped" per run is usually user-determined. The manner of using them is product-determined. In some instances, source code must be altered, while in other instances only additional DD files must be defined.

Monitors provide a number of benefits to the programmer:

- Dumps are small (one to five pages instead of 50 to 250 pages).
- In a test mode, automatic patching of data by a 0 or 1 is often OK and the overall run is not wasted because of a minor mistake.

PROBLEM PROGRAM ABENDS

- **Module in Error**
- **Instruction in Error**
- **Contents of Data Fields Being Operated on by Erroneous Instruction**
- **Contents of Other Data Fields**
- **Intramodule Flow**
- **Intermodule Flow**

Figure 3

PROGRAMMER PRODUCTIVITY TECHNIQUES

- **Structured Design**
- **Top-Down Design**
- **Functional Design**
- **Composite Design**
- **Top-Down Development**
- **Hipo**
- **Structured Programming**
- **Chief (Super) Programmer Teams**
- **Development Libraries/-Librarians**
- **Structured Walkthroughs**
- **Modular Programs**
- **Defensive Programming**
- **Antidebugging coding**

Figure 2

ABEND DEBUGGING TOOLS

- **Cobol Debugging Verbs**
- **Vendor Software Monitors**
- **Time-Sharing Interactive Debuggers**
- **Cobol Version 4 Symbolic Debugging Options (State Flow, Symdmp)**
- **Core Dump Debugging**

Figure 4

COBOL DEBUGGING VERBS

VERBS

Ready/Reset Trace
Exhibit
On
Debug

DEBUGGING VALUE

POSITIVE	**NEGATIVE**
• Cobol source level	• Clumsy and time-consuming
• Output Cobol format	• All trial and error
• Tracing capability	• Always requires additional runs after the fact

Figure 5

- Important debugging data (control blocks and core storage) is selected, highlighted and formatted.
- A partial analysis of the error's cause is often mechanically performed.

Negative Considerations

Unfortunately, the user must also be aware of some negative considerations. First, although highlighted and edited, the data is still most often presented at the machine level. An intelligent analysis must still be performed to relate the monitor data to the source code.

Secondly, automatic patching by rote insertion of a 0 or 1 may correct the immediate problem, but cause further logical failures. If, for example, the Abend was caused by a bad subscript, substituting 0 for the subscript will merely cause further errors. The sim-

(Continued on Page 22)

ABEND DEBUGGING

IN DEPTH

(Continued from Page 21)

ple "numerization" of fields leaves the logical failure intact.

Third, little is provided to help analyze the actual logic error. The selective dumps provide sufficient data to isolate the immediate technical failure, but the data needed for flow reconstruction is often not avaialble.

Last, monitors cannot be used in a production environment. The actual logic failure must be isolated and corrected to ensure the systems integrity. Nonintelligent artificial patching can cause subtle — if not disastrous — damage to the overall utility of a system.

Software monitors can be used as a valuable aid, but with proper respect for their drawbacks.

Interactive Debuggers

Time-sharing interactive debuggers provide a facility from which the programmer can interactively control, modify and examine program execution in a real-time environment. While the program is executing, via terminal commands, the programmer can dynamically trace instruction flow, display field values and modify the execution sequence, among other things. TESTCOB and SYMDMP are two widely used examples of the interactive debuggers.

What is particularly valuable is that when a program under its control Abends, the program can be debugged at the source code level. When an Abend occurs, the debugger automatically displays the module name, source line number and relative verb number causing the Abend. Field values may be requested by source data name. If necessary, dynamic traces and field displays may be requested.

The programmer does not see or need to analyze a core-level dump. The debugging process is handled at the desired source level.

Unfortunately, interactive debuggers are confined to the time-sharing environment. After the system is transferred to a batch production environment, this excellent tool is not available.

Symbolic Debugging

The primary benefit of interactive debuggers is that they provide the necessary data at the source level. To a lesser extent, this source code presentation is provided in a batch mode by the Cobol version 4 compile time options of STATE, FLOW and SYMDMP. When used in combination, they often eliminate the need for a core dump analysis.

The STATE option is illustrated in Figure 6. It is invoked by the compile time parm option of STATE and requires minor execution JCL changes. The primary benefits of STATE are:

- It identifies at source level the module, source line and verb causing the Abend. This is especially beneficial in highly modularized or overlay programs.
- It is easily used.
- It requires minimal increased overhead for the incurred benefit.

STATE, however, also has several drawbacks: It must be specified for each and every module of a executable program; it is not available on all current popular compilers; and it doesn't provide assistance in locating data field value or tracing inter- or intramodule flow.

The FLOW option is illustrated in Figure 7. Like STATE, it is invoked as a compile time option and requires minor JCL changes. FLOW has the benefits of being easy to use as a compile option and addresses the problem of tracing intramodule flow.

However, it doesn't do what STATE does. It has a high execution overhead and it must be specified in each and every module if an intermodule flow is to be obtained.

The SYMDMP option (not illustrated) provides what STATE does but, in addition, provides a source-level core dump. When combined with the FLOW option, it essentially provides a full source-level debugging tool and minimizes the need for core-level debugging.

SYMDMP will identify the module, source line and source verb in error and provide a source-level presentation of all data fields. It is also easy to use on stand-alone or small modular systems.

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B. Goldwater Jr.

E. Janeway

Its drawbacks? The SYMDMP option requires a high overhead utilization of resources; it is not geared for use in highly modular programs; it can be clumsy and difficult to use because of the additional file allocations needed; and it is not appropriate for a production environment.

Core Dump Debugging

Core dump debugging is the historical means of adressing the Abend problem. Depending on whether a SYSUDUMP or SYSABEND option was selected at execution time, either a huge or horrendously huge raw hexadecimal core image of the state of the system is provided.

Nevertheless the dump remains a vital debugging aid because:

- It is the only standard aid provided. All other tools are superimposed on the operating environment and may or may not be available in a critical situation.
- Once mastered, the dump provides a complete picture of the system at the point of error and a virtually unlimited reservoir of information to analyze.
- Core-level debugging is the bottom line in a production environment.

Figure 8 highlights the critical importance of core dump debugging. While the other tools are available and valuable (especially in a test mode), the core dump remains the only assured aid in the production mode.

In spite of the many advances made in system and program design by the advent of software engineering techniques, programming remains a very error-prone activity performed by error-prone people. The available dump debugging aids provide substantial help in analyzing and correcting errors.

Unfortunately, the core dump still remains the necessary pillar of debugging activity. Hopefully, in the future, a source-level debugging report will become the standard aid and alleviate the problems of dump debugging.

DEBUGGING TOOL SUMMARY

TOOL	ENVIRONMENT TEST	 PRODUCTION
Cobol Debugging Verbs	Adequate But Time-Consuming	Inappropriate
Vendor Software Monitors	Usable	Inappropriate to Dangerous
Time-Sharing Interactive Debuggers	Excellent	Not Available
Cobol Version 4 Symbolic Options	Good	Good, But High Overhead
Core Dump	Difficult to Use Unless Staff Properly Trained	Bottom Line Standard Error Report

Figure 8

STATE OPTION

```
//A EXEC COBUCLG,
// PARM.COB=STATE
// COB. SYSIN DD*
      source program
/*
//GO.SYSDBOUT  DD  SYSOUT=A
//GO.STEPLIB   DD  DSN=SYS1.COBLIB
PROGRAM TESTTAPE
LAST PSW BEFORE ABEND=
SYSTEM COMPLETION CODE =OC7
LAST CARD NUMBER/VERB NUMBER EXECUTED CARD
     NUMBER 000796/VERB NUMBER 02

END OF COBOL DIAGNOSTIC AIDS
```

Figure 6

FLOW OPTION

```
//A EXEC COBUCLG,
// PARM.COB='FLOW=10'
//   COB.SYSIN DD *
   SOURCE PROGRAM
/*
//GO.SYSDBOUT  DD  SYSOUT=A
//GO.STEPLIB      DD  DSN=SYS1.COBLIB

     PROGRAM TESTTAPE

LAST PSW BEFORE ABEND=
SYSTEM COMPLETION CODE=OC7
         FLOW TRACE
TESTTAPE  000796,000799,000802
         END OF COBOL DIAGNOSTIC AIDS
```

Figure 7

Bernard H. Boar is project leader for the development and maintenance of the corporate hourly payroll system for the 50,000 blue-color employees of the Bell Sales Division. He is also the leader of a project charged with planning and developing the next-generation corporate payroll system.

The Abend Debugging for Cobol Programmers, *published in April 1976 by John Wiley and Sons, Boar is active in the Association for Computing Machinery.*

He holds a bachclor's degree in Computer Science from City College of New York and an M.B.A. from Baruch Graduate School of Business, where he specialized in computer methodology.

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Fringe benefits cost too much these days to neglect.

Editorial

Benefit of Looking Back

The DP community and the society it serves stand to benefit from ongoing study programs in the history of computing.

The American Federation of Information Processing Societies is now sponsoring a number of activities devoted to this study, and Erwin Tomash of Dataproducts Corp. has founded the Charles Babbage Institute towards the same end [CW, Aug. 7, 14].

A sense of history in any field can show what is truly important to that field — why it exists and where it ought to be going. Appropriately enough, John von Neumann, one of the founders of computer science, perhaps said it best in writing about "mathematical subjects":

"I think it is a relatively good approximation to truth . . . that mathematical ideas originate in empirics, although the genealogy is sometimes long and obscure. . . . At a great distance from its empirical source, or after much 'abstract in breeding,' a mathematical subject is in danger of degeneration.

"At the inception, the style is usually classical; when it shows signs of becoming baroque, then the danger signal is up . . . Whenever this stage is reached, the only remedy seems to me to be the rejuvenating return to the source: the reinjection of more or less directy empirical ideas."

Sign of Change?

Since the inception of *Computerworld*'s "Managers on the Move" column last May 15, announcements featuring women who have been promoted to executive-level positions or recently hired for management slots have been as common as kiwi birds in Alaska.

Perhaps the news of Patricia R. Graves' promotion to assistant vice-president of Trusco Data Systems of Georgia, which appeared in last week's column, signals a break in the long-standing absence of women executives in DP organizations.

We hope to see more such announcements as time goes on.

Data Past

Five Years Ago
Oct. 3, 1973

DES MOINES, Iowa — A data bank law passed by state legislators apparently backfired, accomplishing the opposite of what was intended. In an effort to curtail the release of computerized crime records fed into the Federal Bureau of Investigation's National Crime Information Center (NCIC) system, the lawmakers had enacted a bill they thought would require the destruction of computerized arrest records on individuals found innocent or against whom charges had been dismissed. Instead, according to Attorney General Richard Turner, the law permitted police to release the records of innocent persons, but required them to keep secret the arrest records of those found guilty. Turner called the situation "a classic example of carelessness in legislative drafting."

— — —

TULSA, Okla. — Both IBM and Telex Corp. filed motions here seeking to amend judgments made in their antitrust suit. The IBM motion sought a new trial on the specific issues of the amount of damages awarded to Telex and the injunctive relief specified by Judge A. Sherman Christensen in the case. Telex asked the judge to set aside the $21,9 million damage award he granted IBM for the Telex theft of trade secrets. Telex asked the judge to reduce the amount IBM was required to pay it to around $330.6 million.

Eight Years Ago
Oct. 7, 1970

DETROIT — This city's primary election was highlighted by "discrepancies, irregularities, and a mysterious extra 1,110 votes." The errors were attributed to test decks that didn't work, outside supervisors and observers who were not familiar with computers and inadequately documented backup procedures.

— — —

CHICAGO — Violence, demolition, fire and sabotage threaten university computer centers, the information nets of police and court officials, governmental agencies and industrial and commercial DP centers, according to Neil J. Welch, special agent in charge of the Detroit Office of the Federal Bureau of Investigation. Speaking at an FBI-conducted bomb seminar, Welch estimated total damages in these areas in the last 15 months at $25 million and listed the would-be bombers among the "New Left, the Black Panther Party, the White Panther Party and the Weathermen, a faction of Students for a Democratic Society."

Letters to the Editor

Code of Ethics 'Illogical'

The headline "Code of Conduct Arises from Afips Workshop" [CW, Sept. 4] promised a great deal. But the opening sentence, "Do what is right, regardless of the consequences," can be paraphrased as, "It is always right to do right."

Reading further into the article, I encountered, "information-technology should not be used for any intentional deception, except where weightiest justification is provided;" which can be paraphrased as, "It is not always wrong to do wrong."

Now I'm confused! If "It is always right to do right," then "it is not always wrong to do wrong" is illogical. Do computer people have a different set of logic and moral ethics? Do we subscribe to relative morality? And while we are being illogical, what does being a professional have to do with a code of ethics — or don't we have ethics if we are not professionals?

Thirty participants for three days to generate the so-called "code of conduct"? The mountain groaned and put forth a molehill.

J. Foecke

St. Cloud, Minn.

Scoring on the Greens

I am writing to clarify a point made in "Fast Greens on Par With Fast Scoring at PGA" [CW, Aug. 28].

Referring to Wang Laboratories, Inc.'s and Aptech Computer Systems, Inc.'s participation in the Professional Golfers Association (PGA) tournament at Oakmont Country Club, the story concluded: "The result was the first system with which reporters could directly interact to obtain instantaneous information retrieval."

CompuServe, Inc. has had a computerized golf score tabulation system for more than a year which was used on three occasions by the PGA — once at the 1978 Tournament Players Championship at Sawgrass near Jacksonville, Fla., and twice at the Muirfield Memorial Golf Tournaments in 1977 and May 18-21, 1978 near Dublin, Ohio.

At the 1978 Muirfield tournament, reporters had access to hole-by-hold results as they happened through a version of the Infoplex information processing system, marketed by CompuServe's subsidiary, Plexus Corp.

Computer terminals with user instructions were set up in the pressroom, permitting reporters to run the system at any time for the latest scoring information.

The network set up at Muirfield placed terminals and CRT monitors at several locations throughout the grounds and allowed inquiries on any player for his average score per hole as well as the number of eagles, birdies, pars and bogies. The program also ranked the difficulty of each hole based on the players' performance.

Richard A. Baker

CompuServe, Inc.
Columbus, Ohio

Irksome Question

I have a nit to pick. It would seem that people who make their living in the data processing field should know that the word "data" is plural. For "the newsweekly of the computer community" to misuse the word as if it were singular is deplorable. How about leading a crusade to enlighten readers and especially CW writers regarding the correct usage?

Norman L. Vincent

Bloomington, Ill.

While Reader Vincent is semantically correct, even Webster's New Collegiate Dictionary recognizes data as "plural but singular or plural in construction." In many instances, CW uses the word in a collective sense which warrants singular verb forms. Ed.

The Human Connection

Executives Need Hands-On System Course

By Jack Stone
Special to CW

Training senior executives in information systems is an industry nightmare.

As everybody knows, most business and government leaders are not blessed with our wonderful information systems education. The distressing part is that because of the long and tedious history of doing battle with the information systems departments, most have chosen to ignore its function and avoid learning more about it.

The faithful minority are the real losers: they dutifully appear for the training sessions provided by their own information systems departments and wind up bored to death.

Pains, Pleasures

I have had both painful and pleasurable experiences as a consultant while struggling to develop and implement executive training programs. So I thought it would be useful to devote this column, and others from time to time, to what I have learned about making these programs more effective. Training in technology concepts is this week's subject.

Not too long ago, I had an opportunity to compare concept learning patterns for large groups of people. The occasion was the introduction of an on-line data base management system (DBMS) to a large organization.

One of my tasks was to implement a four-day introduction to the system for the user population which had not had any significant information systems technology training; although many were professional scientists and engineers. As you might imagine, terminals were installed in a classroom, and the instruction consisted of a series of brief lectures followed by hands-on exercises.

Well, believe it or not, of the horde of users that passed throgh the program, the best students were the top-level and middle-level managers. They became completely involved: they ate up the exercises; they whizzed through the optional "experiments;" they scanned their very own data bases — they were terrific! And all this after they entered the class mostly skeptical, and in some cases, hostile.

Terminal Magic

I'm not sure why using the terminals worked so well. Perhaps managers can conceptualize better than other employees or maybe the interactive terminals just sparked a lot of interest. In any case, it is important to apply the following rules:

- **Rule 1.** Orient technology concepts training around "hands-on" keyboard CRT terminals, (microsystem interfaces or whatever else you can dig up). These people learn fast when they are in a highly interactive mode; as a matter of fact, it's hard to pry them loose from the terminals.

I also learned, to my chagrin, that my glorious lectures were no better than second-rate sleeping pills if they lasted longer than two or three minutes.

- **Rule 2.** Do not use conventional lectures in information handling technology with this audience. Limit stand-up presentations to a few minutes and focus the talk on the most elemental ideas the attendees will be addressing during the hands-on session.

Finally, let me talk candidly about the problem of "image." The brutal fact is that most executives view the information systems department as one without "class." And, in response, many management information systems (MIS) people have done their best to perpetuate this belief, particularly when one considers such factors as orderliness, oral communications and user documentation.

- **Rule 3.** Go first class or, at the very least, emulate it for the program's duration.

This means speakers should borrow or rent vested suits; someone should write down an agenda and include a schedule, maybe toss in an objective or two; the training facility should be located sufficiently far from the programmers to avoid hearing their hysterical laughter; and a decent sum of money should be spent for a print job on the narratives to give the attendees a fighting chance at reading their exercises!

I've got a recent case study for you in next week's column.

And if you have had any experience with executive training you wish to share (identities not revealed), send it to me. A free copy of the second edition of my informal paper, "Training the Top Executive," can be obtained by sending a self-addressed, 30-cent stamped, No. 1 envelope to me at Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.

. . . And in This Corner

Crooks Setting Standards As Users Can Only React

By Kenniston W. Lord Jr.
Special to CW

Standards! If I've heard that word once in my career, I've heard it a "zillion" times. Throughout a quarter century, we've had standards committees, national standards organizations, de facto standards, systems design standards, programming standards, audit standards, local standards (enforced or not) and "practical standards."

But suppose, for the sake of argument, that all of the millions of words on the subject had been just the sheer exercise of words; had been a convenient way to convey the impression that we had taken steps to cover organizational vulnerability? Don't suppose — recognize — that millions of dollars of our budgets have been spent in pursuit of the elusive and enforceable code whereby our systems have been constructed and are run.

For what? Has it really saved any money? Has it really made the documentation easier? Has it really normalized project management efforts? Has it really covered that tender part of our organizational anatomy? Has it really prevented computer crime and . . .

Aha! Now the truth comes out. What we haven't been able to do for ourselves in a quarter of a century, the white collar criminal is doing for us free — well, almost. What's another cool hundred thousand?

Read the press. Item after item recounts how the computer has been used by the white collar criminal. Each and every item on fire, theft, proprietary data, pilferage and fraud tells tales of what has gone on before — ancient history, as it were.

While we're sleeping, protagonists of computer crime and abuse are setting our standards for us. They don't have to read a manual to do it, and they don't have to refer to a checklist. They're not even concerned about "Quality Assurance Checkpoint #6," or any other, for that matter. But in their own style, they are setting the rules under which we must operate the DP business for the next quarter century and beyond.

Try as we will, we still have not developed a foolproof method to protect our data, programs, procedures and access. All we have been able to do is to react — not plan, not protect and not prepare.

Why? Are we so lacking in our ability to anticipate where our vulnerability lies? Is it only a matter of money? It might be that we, ourselves, have little concept of what is really important.

"Protect the passwords," said

(Continued on Page 26)

The Taylor Report

Utility's Dunning Letter Could Be World's Worst

By Alan Taylor
Special to CW

I've seen many amusing computer dunning letters, such as one which gratefully acknowledged the receipt of $68.95 but regretfully pointed out a balance of $0.00 remaining to be paid and went on to demand such payment forthwith on threat of credit status loss. But I've seen other erroneous dunning letters of greater import, such as those based upon mistaken records which resulted in the cutoff of heat or other utilities.

Such errors can be computer-related or simply the result of careless bookkeeping.

With the help of a reader from Tewksbury, Mass., I've just been put in touch with possibly one of the worst computer dunning letters in the world. The letter shows so many problems that it is laughable, but it deals with the serious subject of energy cutoff.

It reads as follows:

8/92/17
(Account Number)

(Name)
(Address)

Dear Customer:

Thank you for the recent payment on your gas account.

Unfortunately there does remain a balance in arrears that has to be cleared.

To prevent further collection action, please contact our Credit Dept. at 458-3171.

Thank you for your cooperation.

Lowell Gas Company

At first, I thought it was a hoax. How could the letter contain so *many* errors? To appease my doubts, I called Lowell Gas Co., the purported issuer of the letter. Its credit department confirmed it had indeed issued the dunning letter.

Four Errors

My reader pointed out four computer errors in the letter:

- An unintelligible date — 8/92/17.
- No space to say what recent payment was being acknowledged.
- No space to say how much the customer still owed.
- No address for the gas company on the return envelope.

Personally, I think there is at least one other error — no specified due date for payment of the claimed balance.

Lowell Gas' credit manager admitted some errors. The date was supposed to be Aug. 9, 1978. So, perhaps the editing input or output field was wrong in the program.

(Continued on Page 26)

Errors Humorous, But May Be Dangerous

(Continued from Page 25)

He had no explanation for the missing address — I suspect it was printed on blank paper after being programmed for printed stock.

The procedure was to send the letter to the customer and, if the money did not arrive within five days, a collector was sent out with full authority to disconnect the gas.

Interesting to note, the credit manager was not familiar with the Memphis Light & Gas case [CW, May 8] and thought the company could disconnect for unpaid bills without questioning the accuracy of its records.

A *complete* dunning letter could help prevent the unnecessary disconnection of vital utilities. Clearly, the letter is part of the accounts receivable program's output — the first sentence tells that. And it has access to the new balance and the amount of the last payment, otherwise the second sentence couldn't be used. The date of the last billing must be available — at least the billing cycle date if not the mailing date.

All this information was within reach, but was ignored by the letter's' designer. From a professional viewpoint, this is my main objection.

I see basic DP errors in three areas: programming (date field unsynchronized), operations (printed on blank stock) and design (available information not given).

However, the credit manager at Lowell Gas told me about the system's success: "It has worked pretty well . . . and has avoided a lot of collection calls." Computer systems can be "successful" even when they are dangerously wrong. Everyone in the profession should realize this in evaluating computer "success stories."

In this case, a collector's brief visit to a house, with or without the customer's presence, can result in utility cutoff. While this is permissible if the records are correct, in some cases they are not.

Positive action is needed to initiate discovery of computer errors. Those missing pieces of data in the computer dunning letter should be requirements, as opposed to desirable trimmings.

If a customer is notified in writing of the date of his last payment, of the amount still owed and so on, he can search for old bills and checks to make comparisons. If computer errors are the culprit, the customer or the collector will have an easier time locating them.

On the other hand, if a vague letter devoid of concrete detail is sent to the customer, he may feel it is useless to get his records out, since there are no important details to compare.

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Users Losing Security Game

(Continued from Page 25)

the memo. Why? Because the staff is leaving them all over the place for anybody to look at. How about spending a hundred bucks for a wastebasket-mounted shredder? No. That's not on the authorized equipment list.

Install a software fix to obliterate the password? Nope, other things demand the time. Look around you. How many passwords are affixed to the bulletin board: "TODAY'S PASSWORD IS XXXX."?

"Protect the data," the memo said. Is that why all those programmers have tapes in their unlocked desks? Is that why data entry has tapes that have never been degaussed? Is that why operators would prefer to pull the systems pack and leave the customer master?

"Protect the access to the computer room," the memo said. Is that why the words "DATA CENTER" are prominently displayed on the outside of the room and possibly the building? Is that why the doors are propped open for easy access?

"Control the communications lines," the memo said. Is that why the computer number is only one digit from the organization's main telephone number?

Despite our best efforts, computer centers are still being bombed somewhere in the world. Programs and data continue to be ripped off. People continue to use systems to divert organizational funds into their own pockets.

And all we do is REACT! Lock the barn after the horse is stolen. Why? Because we don't have one iota of a concept of what one single piece of data is worth, what two pieces of data taken together are worth or what a file is worth to the organization that must rely upon the data.

The establishment of standards by the criminal element may seem invisible, but it is very real. Someday somebody will write a book of standards for computer fraud and abuse. But in the meantime, we should recognize that these people are doing for us what we haven't been able to do for ourselves: They are writing a very comprehensive set of systems standards, dollar by dollar.

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Relieves delays to on-line systems caused by the Logical Transient Area being occupied.

Relieves inhibited communications with POWER and other spooling systems which require the LTA.

CFSMTS Overview:

CFSMTS is a DOS/VS system enhancement which provides multiple Logical Transient Areas: one per partition and one for the Attention Routine. CFSMTS is release independent and supports systems with up to 15 partitions. CFSMTS will run on all DOS/VS systems including the S/370 115 through the 370/158, 3031, and S/360 or compatible machines.

Features:

Each problem program can concurrently execute code which requires use of the LTA (Logical Transient Area).

CFSMTS provides a dynamic classification facility to control the concurrent usage of $$B transients which are dependent on a single resource.

The user may classify his own transients or any other transients at any time by executing the CFSMTS program and submitting appropriate parameters.

CFSMTS provides a statistical printout, on demand, showing any overlap that has been gained. These figures show an occurrence count and the elapsed time that '*n*' transient areas were active concurrently. A summary of elapsed savings is also calculated both in terms of time saved and its percentage.

Supervisor Prerequisites:

CFSMTS requires an addition to the standard DOS/VS supervisor; however, this modification contains no executable code. This addition simply reserves space for the additional transient areas.

Hardware Requirements:

The CFSMTS program to activate the Multiple Transient Support requires either a virtual or a real partition of 32K in which to run. This program is executed only to activate Multiple Transient Support and to print the accumulated statistics.

CFSMTS is available from CFS, Inc. as a licensed program product and may be leased monthly, yearly or on a one-time lease arrangement for $130.00, $1,425.00 and $4,275.00 respectively. All three lease plans include maintenance and support for as long as CFSMTS is installed.

Send requests for CFSMTS to CFS. License agreements along with detailed information will be sent by return mail. Inquiries may be directed to:

Director of Marketing
CFS, Inc.
1330 Boylston Street, Suite 608
Chestnut Hill, Massachusetts 02167
(617) 566-0222 Telex 94-0285

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Random Notes

Reports Enhanced In 'Maps' Update

PALO ALTO, Calif. — A generalized software package, enhanced by Ross Systems, Inc., offers financial modeling and report formatting capabilities to users of Digital Equipment Corp. PDP-11s running under RSTS/E

Version 3 of Maps has a built-in data base capability, using DEC's RMS-11K facilities, to maintain data on a large number of organization units on an Isam file, a Ross spokesman explained.

Written in Basic-Plus 2, Maps creates its output from matrix descriptions of the rows and columns desired. Additionally, the package has the ability to answer "what if" questions as well to perform consolidations, the spokesman continued.

The package is available on a time-sharing basis; alternately it can be licensed to operate inhouse on a single CPU for a one-time fee of $15,000, Ross stated from Suite 208, 1900 Embarcadero, Palo Alto, Calif. 94303.

Money Risks Eased With Infonet Services

EL SEGUNDO, Calif. — Computer Sciences Corp. (CSC) has added a series of petroleum and mining investment programs to its Infonet time-sharing service.

The programs were developed by Data Research Associates, an international consulting firm. They enable users to determine the financial risks, profitability and capital requirements associated with mining and petroleum ventures, according to a CSC spokesman.

The service includes petroleum and mining investment analysis, risk analysis of oil and gas reserves, a history of federal offshore lease sales and a data base of costs for offshore exploration and development activities.

The service will be continually updated to keep abreast factors affecting economic analysis, the spokesman noted.

More information is available from CSC at 650 N. Sepulveda Blvd., El Segundo, Calif. 90245.

Already Four Years Old

T/S Users Group Marches On

By Don Leavitt
CW Staff

BOULDER, Colo. — The time-sharing remote computing business appears to be growing 20% to 25% per year. Although the Association of Time-Sharing Users (Atsu) is not growing at a comparable rate, the group's executive director seemed pleased with its accomplishments during its four-year existence.

Hillel Segal acknowledged that Atsu experienced its greatest growth in the first year, when it counted 1,000 members, but he said the steady increase which has brought the present total to 1,500 should continue, especially as more people become aware of the association.

Atsu has grown mainly through its publications, he continued, noting it has no annual national conference and its chapters in many large cities have died out. However, members in New York, Chicago and Cleveland "and perhaps other" cities meet regularly.

The New York Chapter is planning a series of seminars this year and the program chairman has invited Kenneth Iverson — "the father of APL" — to speak.

The directories are clearly Segal's pride and joy. Building a part at a time, Segal and the now four full-time employees of the association have compiled a three-volume loose-leaf collection of reports covering a multitude of topics related to time-sharing.

The directory includes a listing of companies in the business, telling where they are headquartered, what they feature in service, what their limits are and how users can reach them. Moreover, Atsu lists available services by geographic region, indicating local office locations and available phone numbers for access.

Packages Detailed

The largest portion of the directory provides one-page write-ups of various classes of application systems that are available from individual vendors. Since the same service may be available from more than one vendor, this approach may give users an insight into the vendor's perception of what they are offering, Segal noted.

Data bases maintained by outside organizations may be of great benefit to time-sharing users, and the Atsu directory includes what Segal "modestly" considers the best compilation of information available about these data bases.

Currently under development is a section of the directory that Segal said will provide "as much detail as we can get," on terminals.

Support for the members is also provided with a series of benchmark experiments run by Real Decisions, Inc. of Westport, Conn., in conjunction with Atsu. In these tests, standard programs are executed on different networks to determine which handle different kinds of work best or least expensively.

While Real Decisions sells its test results to anyone interested in them, they are provided free to Atsu members.

Although Atsu has never run its own annual meeting, Segal said he is talking to sponsors of various established conferences to see if the association might usefully develop and run specialized technical sessions for them. He declined, however, to name the shows he has contacted.

The industry does provide backing for Atsu, he said, pointing to the present 35 corporate sponsors, all of whom are time-sharing/remote computing vendors who pay a substantial price to belong.

Individual memberships — at $20/year — include the association's monthly newsletter and the Real Decisions benchmark report. The directories, which are updated completely at least once each year, cost an additional $65.

Atsu is based at 75 Manhattan Drive, Boulder, Colo.

IBM Backs Cobol on Series/1

ATLANTA — A pair of packages is now available from IBM's General Systems Division to support the development and execution of Cobol programs on the Series/1 minicomputer. Neither package is a program product with centralized IBM support.

An Installed User Program, the Series/1 Cobol Subsystem Compiler provides the classic business-oriented facilities of the language plus the capability of calling assembler and other Cobol subroutines to handle logic outside the scope of the calling program.

According to a spokesman, the Series/1 Cobol Runtime Monitor is a Field-Developed Program that provides the interface to the Real-Time Programming System and controls the virtual storage environment for user Cobol programs. A set of assembler subroutines are included to provide full screen control of the IBM 4978 or 4979 display station, he added.

The Display/JCL Monitor is another part of the Runtime Monitor. This set of modules executes the commands entered through the Cobol program, or the CRT; it aids the programer by displaying a menu of possible operations.

The Cobol compiler, developed by Advanced Software Products, Inc. of Arlington, Va. [CW, Jan. 17], was designed according to specifications of ANS Cobol-74 "as understood and interpreted by IBM as of September 1978" with the exception of the RERUN clause, he continued.

The compiler — identified as product 5796-NPW — will be available Nov. 17 for a monthly charge of $310, with payments waived after 12 continuous months. The Runtime Monitor — product 5798-NTF — will be available at the same time for $40/mo; its payments, too, will be waived after one year.

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Package Runs Multiple Payrolls and Personnel

ANDOVER, Mass. — Users with IBM System/3s or DOS-oriented 360s and 370s have another payroll/-personnel package to consider: Payroll Plus from Software International. The system is said to allow multiple earnings and deduction categories with user exits for special calculations.

Employee and employer tax calculations to meet requirements at the federal, state, county and even city level are built in; and changes in tax laws are taken care of by the vendor.

Payroll Plus can manage different payrolls, each running independently — perhaps with different frequencies — in a single processing run. Yet the system maintains complete reporting and audit control for each payroll as if it were running alone, he claimed.

The personnel information base includes standard data as well as salary and job histories for multiple job changes. Personnel reporting includes outputs for workmen's compensation, bonding and Equal Employment Opportunity requirements.

Different methods of pay along with checks that are either system-generated or manually prepared can be handled with Payroll Plus. Both special-purpose checks and voids are routinely managed with complete auditability, the company said.

The system is said to establish comprehensive control of labor costing. This support is available as required, whether or not Software International's general ledger interface is being used: the interface can assign account numbers for earnings and deduction categories, the spokesman added.

The report writer portion of the package includes a library of standard reports as well as a facility enabling the user to create specialized reports.

The standard report library includes tax reporting with 941 (quarterly and annual) and W-2 forms, payroll and tax registers (detail or summary) and employee history information reports.

The Payroll Plus system requires 54K bytes of memory and costs $17,500 for DOS users or $12,000 for those on small systems such as the System/3, Software International said from 2 Elm Sq., Andover, Mass. 01810.

'Safes' System From ICL Aids Factory Management

E. BRUNSWICK, N.J. — U.S. Manufacturers with ICL, Inc. System Ten/220 CPUs can now acquire the Safes software modules from any of the vendor's offices to support their factory management operations.

Developed in the UK and marketed there for the past two years, Safes includes five modules which can be used individually or collectively as part of an integrated approach to a range of problem areas which are obviously interrelated, a spokesman said.

A bill-of-materials processor is one of the modules. Costing, inventory control, material requirements planning (MRP) and work-in-progress are tracked and managed by the other four modules, he explained.

Intended for small to medium-sized firms or subsidiaries of large organizations that require local support, the Safes approach "does not attempt to change the way a factory is run. Instead, it offers fresh information, on-line, so that managers can make well-planned decisions," the spokesman continued.

The bill-of-materials processor is said to process 10 levels of parts explosion, providing indented listings for standard output and a report generator — supporting arithmetic calculations, file updating and runtime entry of values — for customized or one-time printouts.

The costing module provides a classic pyramid costing of all items at standard and current cost and also features a submodule that can project costs and their impact on operations and profits, the spokesman asserted.

The extended MRP module is said to provide a bill-of-materials explosion to produce manufacturing and purchasing schedules from known demands or forecasts. It accounts for stock on hand, stock due and part leadtimes, ICL claimed.

The cost of the complete five-module Safes is $20,000; individual modules can be purchased for prices ranging from $2,500 to $5,000. Ten days of on-site training, documentation and a 90-day warranty are included, ICL noted from 197 Highway 18, E. Brunswick, N.J. 08816.

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DBMS Backs Research in Canadian Orchards

Special to CW

KENTVILLE, N.S. — When the Canada Department of Agriculture Research Station here found itself buried in fruit statistics and with no way to efficiently keep historical record data on fruit production, it turned to a software company for help and got it.

The Tree Fruit Record System now keeps track of all planting, pruning and picking of fruit grown in the research station's experimental orchards. The Annual Insect Injury System monitors the level of insect damage to apples throughout the apple-growing area of Nova Scotia on an ongoing basis and also contains data for the last 25 years.

Both systems are based on Data Boss/2, a data base management system from Florida Computer, Inc. that runs on Digital Equipment Corp. PDP-11s under RSTS/E.

Inventory File

Central to the Tree Fruit Record System is an inventory file showing location, species, variety and strain as well as pruning, fertilizer and other experimental treatments for each of approximately 12,000 fruit trees.

Historical data to be included in the system covers one orchard planted 40 years ago and many as much as 15 years old.

Ad hoc report requirements may now be satisfied on-line in a simple format, without additional programming.

For years, the researchers had to rely on manual methods of recordkeeping for their expanding experimental orchards. Now, using five data bases, the station is able to record up to 30 different entities regarding each of some 1,100 strains of apples, pears, peaches, plums and cherries on 52 rootstocks. The record system also produces turnaround forms custom-designed for each individual orchard.

Automated data management is more important than ever, since in a 10-year period the research station's orchards have increased from 5,000 to more than 10,000 trees.

With the Tree Fruit Record System, researchers are much better equipped to determine the optimal conditions for production of tree fruits and to determine the long-term effects of experimental treatments, according to G.L. Brown, biometrician at the station.

"The system has allowed us to store and manage our data, whereas before it was extremely difficult to recall, and almost impossible to measure, the progress of so many different strains of fruit grown under such a wide variety of conditions," he explained.

The system interfaces with the research station's own Comfast statistically oriented data base system. Users may specify data to be retrieved in a flexible, conversational manner, and the system will automatically load the data into Comfast format, ready for the plotting of graphs or statistical analyses.

Data Entry Chores Eased on PTS/1200s

NORWOOD, Mass. — A software package that provides data conversion and editing capabilities for Raytheon Data Systems Co.'s PTS/1200 Mark-I and Mark-II systems is now available from the company.

The Source Data Entry (SDE) package is intended to let DP novices develop and execute tasks on distributed processing systems that are primarily used for IBM 3270-type interactive tasks, remote batch processing, local processing and report printing functions in a data communications network, a spokesman explained.

Seven Features Touted

Seven distinct features were cited by Raytheon as capabilities that make SDE "ideal" for remote sites with a mixed workload: automatic cursor positioning; table lookup; reasonableness checking; arithmetic computation and crossfooting; batch balancing; record searching by multiple keys; and record insertion and deletion.

SDE users can also program specialized subroutines using the PTS/1200's Macrol language, the spokesman noted.

SDE is included in PTS/1200 systems at no extra charge, Raytheon said from 1415 Boston-Providence Tnpk., Norwood, Mass. 02062.

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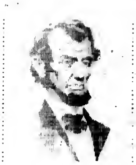

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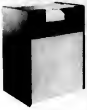
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SBC's 'Escort' Aids Distributors

GREENWICH, Conn. — A system designed to shorten the order entry and confirmation cycle for distributors and manufacturers, especially those in the electrical business, is now available through the remote computing facilities of the Service Bureau Co. (SBC).

The Escort service, developed by SBC in conjunction with the National Association of Electrical Distributors (NAED), has been implemented on the network's Call/370 facilities. It can be accessed by a terminal in the user's office or linked to a larger user's in-house CPU, a spokesman noted.

For the service to be effective, both distributors and manufacturers have to be taking part and, as the spokesman emphasized, the more of each the better. If a manufacturer can get all its major distributors on the system, it can balance the service it offers; if a distributor can get all its manufacturers on Escort, it has an easier way to place all its orders, he explained.

In any case, there are security provisions built into the service so that orders and confirmations are accessible only by those parties who should be able to see them, SBC said.

To use Escort, distributors enter purchase order information. The entries are checked by the service for completeness and accuracy, and errors are corrected by the user before the entries are sent to manufacturers.

After the master purchase order file is updated, the orders are made available for access by manufacturers. These firms, In turn, enter their confirmations following the same pattern of entry-édit-error correction used by the the distributor.

The system can easily handle multiple shipping and delivery points as well as different ship-to and bill-to addresses, the spokesman added.

Initial use of Escort is dependent on a one-time subscription payment of $1,000 to NAED. After that, costs vary depending on volume of use, subject only to a $100/mo minimum applied on a "per-contract" basis.

SBC's network is international in scope. The company is based at 500 W. Putnam Ave., Greenwich, Conn. 06830.

CICS Sessions Eased Under 'Intertest'

RIVER EDGE, N.J. — All versions of IBM's CICS/VS, including the recently released version 4.1, are supported under the symbolic testing facility to be available shortly as an adjunct to the Intertest package, according to the vendor, On-Line Software International.

Intertest/Symbolic provides a test bed for both Assembler and Cobol CICS/VS applications. With the new facility, users can set both conditional and unconditional breakpoints based on program locations identified by Cobol statement number or paragraph name or Assembler label, a spokesman said.

Prevents Crashes

Beyond that, Intertest/Symbolic prevents CICS production or test system crashes by monitoring any declared mix of programs, transactions and terminals or even the entire system, he said. Illegal actions are blocked before they do any damage, he added.

A dynamic patch facility permits insertion of blocks of instructions at any number of points in a program. This feature allows new code to be tested before permanent changes are made in a program, the spokesman explained.

Two statistical functions are also available for monitoring test sessions.

Intertest/Symbolic costs $5,000, the vendor said from 65 Route 4 East, River Edge, N.J. 07661.

Credit Unions Backed With GA-Based Logic

LIVINGSTON, N.J. — Credit unions can run a lot of their own DP on General Automation, Inc. Model 220 minicomputers if they have a software system developed by and now available from System Generation, Inc., according to a vendor spokesman.

Written in Cobol, the package includes such applications as positive tape payroll, a totally integrated general ledger accounting and share draft processing, he reported.

The system has been field tested for more than six months. It operates under modified General Automation Control III software and supports up to four CRTs.

Cost of the basic system including a GA 220 varies with the facilities required but starts at $39,187. The software by itself costs $7,500, he said from 513 W. Mt. Pleasant Ave., Livingston, N.J. 07039.

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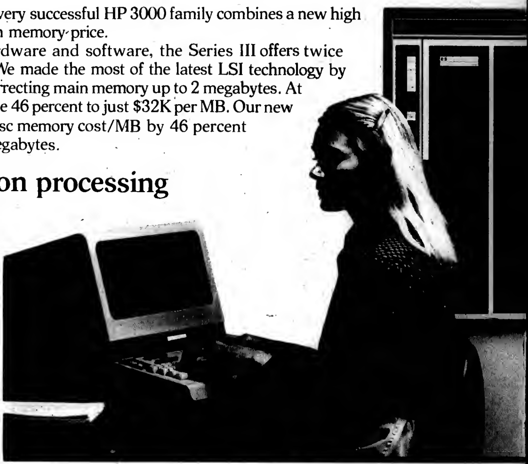

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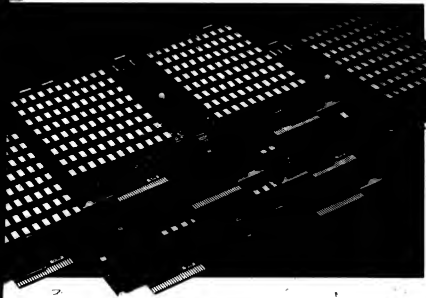

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By Rudolph C. Mendelssohn
Special to CW

The people who do tabulations at nearly 200 computer centers around the world may speak English, Hungarian, Hebrew, Arabic, French, Finnish or Thai. But they have a second, common tongue: they all use a unique language that tabulates and displays numerical tables by computer line printer or an electronic photocomposer. It is called Table Producing Language (TPL) and is the result of five years of innovative work by the Bureau of Labor Statistics (BLS) of the U.S. Department of Labor.

Most users of TPL are in commerical enterprises throughout the U.S. and Canada. These include banks, insurance companies, time-sharing services, heavy industrial manufacturers, pharmaceutical houses and research and planning organizations. But state and municipal agencies across the country and more than a dozen federal agencies (including both houses of Congress) are also users. Among educational institution users are a dozen major universities.

The count of TPL installations abroad shows 15 national statistical agencies, located mainly in Europe, but ranging geographically from North Africa and the Mideast to Australia and Thailand. United Nations installations in New York and Geneva use the system themselves and distribute it to member countries.

The American Statistical Association's Committee on the Evaluation of Statistical Program Packages, looking into 11 leading packages, studied two principal characteristics: tabulating power and simplicity of langauge. TPL was judged to be the best on both counts by a wide margin.

Differs From Cobol, Fortran

The new language differs from the traditional Cobol and Fortran in important ways. The latter have general application in the sense that they are used to solve a wide spectrum of problems in business and science — problems ranging from accounting, inventory and production to forecasting the weather and getting men to the moon. But the user must give the computer step-by-step instructions on how to solve the problem being presented to it. That means the user must know how computers work.

Most users except those in the computer sciences do not acquire this knowledge without considerable extra effort. In addition, "procedure"-oriented languages require that each task be dealt with as if it were without precedent. At one time, BLS programmers had to write a new computer program for each new table — a fairly expensive and restrictive requirement.

TPL belongs to an emerging class of very high level, problem-oriented languages — "very high level" because they are disengaged from the computer and "problem-oriented" because they deal with specific problems. Early efforts created systems called Strudl and Stress to help structural engineers solve problems of structure and stress in building bridges. In another instance, a language call Coordinated Geometry (CoGo) helped develop the unusual design and construction of the Watergate complex in Washington, D.C.

Specific Focus

TPL has limited application — it can only tabulate data and display results, nothing else. On the other hand, this specific focus has allowed the embodiment of several advantages over the better known traditional, but less specifically directed, languages.

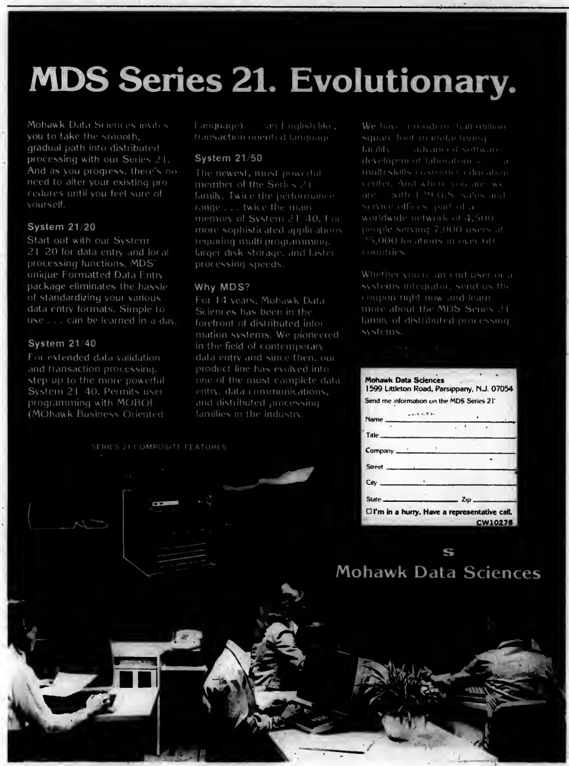
First, the TPL system, a problem-oriented language, already knows what a table is and how to generate one. It only needs to be told the particulars about the specific one wanted. Thus, when describing the desired table with TPL, the user need not go through the tedious and time-consuming effort of telling the computer, step by step, how to make tabular calculations and lay out a table framework.

Moreover, TPL allows BLS social scientists who are not computer experts to use the everyday common BLS language and nomenclature to describe the tables. In short, TPL has reduced a burden, speeded work and increased the BLS capacity to respond.

Print Control Language

TPL serves table production apart from speeding tabulation. It is always helpful to have the results of TPL well structured and labeled for easy use in production and analytical tasks. For this purpose, the numbers must be

(Continued on Page 38)



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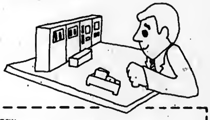

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Table Handling, Makeup Tied in Operation at BLS

(Continued from Page 36)

surrounded with a clean and concise framework of explanatory alphabetic information, such as table and column titles; box heads and horizontal rules so that data will make sense and be readable.

For publication, the requirements are more severe and the display facility has been extended to meet these needs. It is called the Print Control Language (PCL). Through PCL, the user can specify column and stub widths and insert his own alphabetic labels for each variable as well as footnotes and other text. Decimal points and special symbols, such as dollar signs, are available.

There are options for hyphenating and centering titles, placing more than one table on a page and having headings span the body of a table. Options also include vertical position control, indentation of footnote text and other subtle features for alphabetic displays that help make tabular material sensible and easy to read. Taken together, these features can create tables that are acceptable for direct photo-offset printing by BLD in its periodicals and bulletins.

Composition Common

Electronic photocomposition of text has spread rapidly in the printing industry and is now commonly used in publishing newspapers, books and journals because it is cost-effective and speedy.

Ordinarily, it is driven by a magnetic tape containing compositor instructions formed by a Linotron Master Typography Program (MTP), which provides the codes for font style and boldness as well as other information such as page number, paragraph and other indications associated with each character in the text being set.

The Linotron MTP is text-oriented. Because the format of text on a printed page often does not differ in basic ways within the same publication or even from publication to publication, it is practical to prepare the computer programs needed to create the text image thoughout MTP.

On the other hand, table production by Linotron in the past required a computer program for each table format to be printed. For BLS, this was an impractical task for several reasons.

First, the variety of BLS tabular presentations is unpredictable and practically unlimited.

Second, BLS journals, pamphlets and other standard periodicals contain a mixed format.

These barriers have been overcome by extending PCL to drive photocomposers. Because It is a generalized tool to format tables, the need to write tailored programs to generate editorially acceptable tabular display using the line printer had been removed.

For photocomposition, there remained the task of assigning compositor commands to each character and symbol that was to appear in the table. For example, these commands define details of the table framework such as style and size of type wanted, underscoring, column width and horizontal and vertical rules.

Like BLS, the U.S. Naval Observatory has a mandate to print masses of information in tabular form. And, fortunately for BLS, the expert systems staff at the U.S. Naval Observatory's G.W. Hill Computer Center found a path that bypassed the need for programmers to become familar with the MTP and the way Linotron works.

Staff members developed the Fortran Automatic Typesetting Systems (Fats), which has been designed for users who have little knowledge of printers' terminology, procedures or measures and who wish to print mostly tabular data. User-written Fortran (or PL/I or Assembler language) main programs call on subroutines programmed into Fats to generate the necessary Linotron codes that are then written onto tape, together with the data for display.

While Fats was a major step forward, only programmers can use it. Because it was the intent of BLS systems staff to remove the requirement for programming skills to generate Linotron tables, all that remained was to join PCL and Fats. This has been done.

Now, the facility comprises all of the wide-ranging PCL capabilities plus opportunities for typographic enhancements via electronic photocomposition. These include choices of font style and boldness and size of type; boldness in vertical and horizontal lines and underlining rows to indicate totals or so.

Users of the PLC photocomposition capabilities can publish tables that appear to be typeset. In other words, they are of high visual quality. But the greater cost of mechanical typesetting need not be undertaken.

The Goverment Printing Office added the RCA Videocomp to its line of photocomposers not long ago. It is now available on a wide scale at the printing office and elsewhere.

The TPL/PCL photocomposition software was designed to be as independent of the special features of the Linotron as possible. It was relatively easy, therefore, to couple PCL with the newer Videocomp machine and give the BLS greater flexibility.

The approach was different, however. In this case, the Fats routines could not be used because they were keyed to Linotron. Instead, the bureau's systems staff developed the equivalent of a subset of Fats, consisting of only those routines needed to meet bureau requirements.

For those interested in a conversion project, the principal areas of difficulty would be in adaptation of the units of measurement that specify the size of type and the nature of the photocomposer language to the new photocomposer. A reasonable estimate of the time needed to create an adaptation to another photocomposition system that had no unusual features would be two months. However, depending on turnaround time for testing and the quality of documentation of the target photocomposer, this could extend to four months or a year.

These speculations about time required for conversion do not include the time required to learn how the TPL/PCL system works. This is estimated to be several months.

Mendelssohn is assistant commissioner, systems and standards, at the Bureau of Labor Statistics.

TP Monitor Makes DP Access Grow

By Tim Scannell
CW Staff

ATLANTA — The farming industry has come a long way from relying only on a handful of seeds, some soil and a little rainfall to yield a successful harvest. Today, complex chemical fertilization procedures are as important to the industry as crop rotation patterns and planting schedules.

D.M. Weatherly Co. is an international chemical engineering contractor specializing in the operation of fertilizer production plants. Consequently, the company's version of "getting back to the soil" is thorugh such "tools" as nitric acid and diammonium phosphates rather than shovels and hoes.

Reacting to the farming industry's continual scientific growth, D.M. Weatherly recently upgraded its DP system by installing a teleprocessing (TP) monitor and related software. The current system, which supports 11 terminals distributed around the plant, has reportedly increased the engineering staff's programming flow by 1,000% and accommodated the firm's blossoming interest in farm-related chemical research and development.

The firm originally used an IBM 360/30 that was plagued by numerous backlogs because of the engineering staff's limited access to the CPU. Engineering runs or computer programs were limited to a maximum of five per day under that system, according to Bruce Weatherly, vice-president of purchasing and finance.

"We were operating in an environment of poor utilization of computer resources," Weatherly said. "The prime engineering function . . . and our expediting and accounting information was not available to the users in a timely manner."

Company officials decided to explore the possibility of using a series of terminals, dispersed around the plant, to allevi-

(Continued on Page 43)

Key Unknown to All

Motorola Extends DES Key Management

By Brad Schultz
CW Staff

SCOTTSDALE, Ariz. — A major vendor of encryption hardware based on the federal government's Data Encryption Standard (DES) algorithm has introduced a means of generating and using encryption keys without human knowledge of their definitions.

The Government Electronics Division of Motorola Semiconductor Products, Inc. has added the DES4100 KGM key generator and the DES4100 KLM key loader to the Infoguard line of DES-compatible security products unveiled last winter [CW, Jan 9].

From a security standpoint, key management is perhaps the most crucial aspect of data protection by encryption because the key — a numeric character string — defines the codes by which data is "scrambled" prior to transmission and unscrambled upon reception.

"In an encrypted data communications network, each protected line will have an associated unit number and address under which encrypted keys are stored in the key generator's nonvolatile semiconductor memory," a Motorola spokesman explained. "The key generator will permit an operator to designate from a keypad which keys shall be generated for which units — but not the keys themselves."

These keys "will be produced by the key generator and stored within its own control memory — 'inaccessible' to the outside."

The key loader is a microprocessor-based, hand-held device interfaced to the key generator and network security module (NSM) through "electro-optics" comprised of a photo transistor and LED located on top of the unit. The portable device is capable of storing 32 different keys; with optional memory, it can sort up to 256 keys, the spokesman said.

"If either the front or rear panels [of the loader] are removed, tamper switches are activated, cutting off power, 'zeroizing' all memory [and] eliminating all keys stored. Likewise, if the key loader is interfaced to an unauthorized NSM, the keys are zeroized," he noted.

A key generated by the key generator is loaded into the key loader, which then sends this data to the NSM. This module is the point at which the key is applied to the task of scrambling outgoing "plaintext" — the ac-

(Continued on Page 42)

Split-Platen Printer Merits Attention in Business World

By Barry I. Kelman
Special to CW

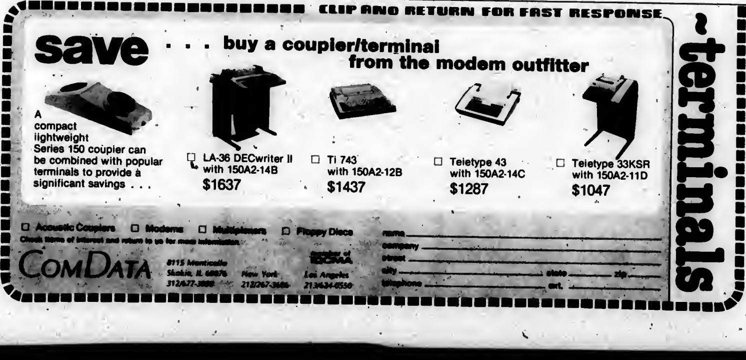
Terminals which are capable of alternately printing two documents without requiring an operator to load and reload each form have been around for many years. They are especially popular in savings and loan, mortgage banking and stock transfer applications.

Other specialized applications, such as printing documents at automobile rental agencies, also use split-platen printers. But for some reason the terminals have not been widely accepted elsewhere in the business community.

As an inexpensive laborsaving and timesaving device in a warehouse or distribution center, where multiple sets of multipart forms are consistently used, split-platen printing terminals would seen to be an obvious choice. It is a simple task to set up a split-platen terminal with both packing lists and shipping labels, for example. The user would save quite a bit of time, especially if those are the only forms regularly printed at

(Continued on Page 40)

The business community has, for years, ignored a product that promises productivity and throughput increases. That product, according to author Kelman, manager of software development at Perkin-Elmer Data Systems' Terminals Division, is the split-platen printer terminal.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Split-Platen Terminal Printer Merits Attention

(Continued from Page 39)

the terminal.

A typical distribution system uses picking tickets, packing lists and shipping labels. In this system, orders are received by phone, entered into the computer and transmitted via communications line to the warehouse terminal.

However, before the terminal can receive orders, a telephone call to the terminal operator is often necessary to make sure the proper forms are loaded. On the other hand, the first printed message at the terminal location may be a forms alignment/setup message.

In either case, time is lost until the proper forms have been located and loaded or verified as already being in the printer. The problem is worse if the operator is a clerk who is unfamiliar with computer peripherals.

Eventually, a batch of orders is transmitted and printed on a multipart form which consists of a picking list, a packing list, an invoice copy and, usually, a few more copies for salesmen and the files.

When the orders finish printing, the operator must be alerted again to change the forms, this time mounting the shipping labels. A batch of shipping labels is subsequently transmitted and printed.

In this system, a user must batch orders and shipping labels separately unless he has an expensive, custom form that combines both.

The terminal operator is constantly changing forms and, when is busy at some other task, the host computer must wait for the proper form to be mounted in the printer. The result is inefficient use of the two most costly resources, the CPU and the operator.

First Benefit

To a shipping supervisor who always seems to be waiting for his orders or to a DP manager who can't seem to produce those batch orders fast enough, the first benefit of using the split-platen terminal is the possibility of having a true on-line system.

Since the terminal is dedicated to this application, always having the two forms ready for printing means the orders and labels may be transmitted whenever there are enough to justify an order run.

It doesn't matter whether one program produces the orders and labels concurrently or two programs produce the data separately; the main point is that there is no longer a need to wait for forms loading.

If a single-platen system is part of an on-line system that spools the print files for the orders and labels to disk or magnetic tape for later transmission and printing, those peripheral devices could be freed by using the split-platen terminal. Forms would actually be printed on-line, as they were prepared by the host processor.

From the programmer's and designer's viewpoint, programming considerations, printer controls and telecommunications are not very different for either type of terminal.

Low Overhead

The extra overhead is minimal. For example, "multicode" sequences direct the Carousel 350, a split-platen terminal from Perkin-Elmer Data Systems, to position the print horizontally and the platen vertically, to select either the left or right platen and to set the forms length and left margin position for the currently selected platen.

The multicode feature provides a special character which precedes all control sequences; thus, the multicode character followed by lowercase "i" selects the right platen; the multicode character followed by lowercase "o" selects the left platen.

Only the most recently selected platen is moved by vertical positioning commands such as Line Feed, Addressable Vertical Tab and Vertical Fine Increment.

Carriage Return moves the printhead to the left margin set for the currently selected platen. "Escape" is generally used as the multicode character; other characters are optional for those systems in which Escape must be reserved for other functions.

Length and Margins

The only additional overhead required is transmission of a short sequence to set the forms length and margin positions at the beginning of each run and transmission of the two-character platen selection sequence, once for each form.

When work is light, orders and labels may be removed as they are printed, and the two documents may remain together at all times. Multiple shipping labels could just as easily be produced for each order; it doesn't matter whether the order is one page long or 20 pages.

A similar procedure could be followed in a manufacturing environment. The printed documents might be the manufacturing schedules or work orders and the invoice set.

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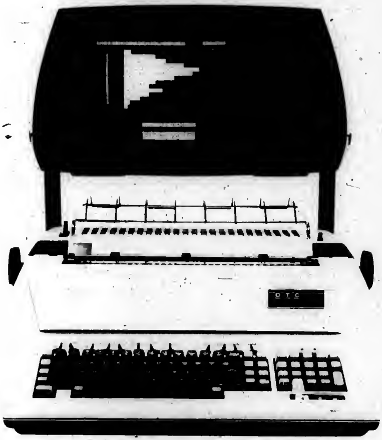

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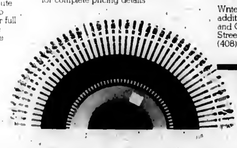

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ITT/CSS Starts Switched Private Net Service

NEW YORK — ITT Corporate Communications Services, Inc. (ITT/CCS) has announced a private coast-to-coast telephone network service intended to provide economical interoffice phone call rates for business and government users.

The Switched Private Network Service (SPNS) now serves 16 cities with additional connections possible anywhere in the continental U.S., according to ITT/CCS President J.C. Reynolds.

Users are connected to the SPNS service by a dedicated line from each calling location to the nearest computer-controlled ITT/CCS switching center, he explained. Customer calls from one location to another are then routed automatically over ITT/CCS-provided lines between seven switching centers.

The network now links Atlanta; Baltimore; Boston; Chicago; Cleveland; Dallas; Gary, Ind.; Houston; Los Angeles; Milwaukee; Newark, N.J.; Philadelphia; San Diego; San Francisco; and Washington, D.C.

Switching Centers

The heart of the network is its switching centers, which are composed of two technologically discrete parts: the switching CPU and the modular switch matrices. The solid-state switching CPU was designed to provide the customer with network basis, a company source said, adding that the switching CPU can access lines and/or trunk interconnections between the switching centers and the customer site.

A main switching and network control center for the network is located at One Whitehall St. in New York. This center allows status monitoring of all other centers in the network and the transmission facilities that link them, reportedly enhancing total system reliability.

The SPNS design minimizes the probability of blocking on trunk groups or through the switch, thus lowering the frequency of lost calls or regenerative attempts, the source continued.

Key switching elements are redundant to minimize equipment outage, the source said, adding that triple redundant power supplies support each switching center, providing battery and generator backup for commerical power consumption.

Service features planned for SPNS include enhanced data protection, detailed per-call billing, traffic statistics compilation, desk-to-desk dialing, abbreviated dialing, hotline service, conference calls and project billing for specific sub-billing accounts.

Rates include $30/mo for each access line, a $150/mo minimum charge and 15.8 cent/min to 19.8 cent/min usage as a function of time and distance. In addition, there is a one-time installation charge of $100 per access line.

ITT/CCS, an ITT subsidiary, is located at One Whitehall St., New York, N.Y. 10004

Brochure Offered By Phone I

ROCKFORD, Ill. — A four-page brochure describing the functions and operating elements of Phone I's P1-5 data concentrator is available at no cost from the firm.

The document reportedly tells how "anyone" can enter data records through push-button telephones for "immediate" storage on computer diskettes. Phone 1 can be reached through P.O. Box 1522, Rockford, Ill. 61110

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Two Devices By Motorola Back DES

(Continued from Page 39)

tual data to be protected — or decoding incoming "cipher-text" — data already scrambled.

The critical virtue of the key generator is that generation is performed pseudorandomly — there is supposedly no perceptible "pattern" to the stream of keys produced, Motorola said.

DES critics have noted that if a pattern were perceptible, then a computer system employing current technology — albeit in an extremely sophisticated manner — could discover the definition of a particular key and thus be used to access the data encrypted by that key [CW, June 19].

The extent of human involvement with the key used in a transmission has long been recognized as a measure of that transmission's vulnerability to tampering. Proponents of the standard — developed by IBM and adopted by the National Bureau of Standards (NBS) last year — have therefore argued that key management without human knowledge via the DES algorithm can render unbreachable security.

"Since the NBS standard is a public algorithm," the Motorola spokesman said, "its security lies in the keys and key management, not in the secrecy of the algorithm. Key management is one of the most difficult problems with which cryptographic equipment users must deal.

"Motorola has analyzed the problems of key generation, key distribution and key insertion and has devised unique key management systems and products which provide users with more security for protecting their computer networks," he claimed.

A typical Infoguard network configuration would include one key generator, several key loaders and any number of NSM encryption devices, the spokesman noted.

The DES4100 KGM costs $6,500; the standard (32-key) KLM goes for $1,500, while the optional 256-key loader costs $1,900. Motorola's Government Electronics Division is at 8201 E. McDowell Road, Scottsdale, Ariz. 85252.

Codabar Gains Visual Verification

DAYTON, Ohio — A Comparison/Verifier Terminal said to provide human-readable verification of scanned Codabar messages has been introduced by Monarch Marking Systems, Inc.

Codabar, a bar code similar to the Universal Product Code, is presently the "de facto standard" for library use, according to Monarch.

The terminal was originally developed for E.I. duPont de Nemours for matching and verifying the labels and contents of packing crates, according to a Monarch spokesman. It was "designed to be rugged" for use in industrial environments, he added.

The terminal is programmed to compare key-entered messages with scanned messages, which can be entered with a hand-held wand or a laser scanning head connected to the unit, the company said. When the two messages coincide, the terminal emits an audible signal.

If the messages are not identical, both are displayed on the terminal's 32-character, 5 by 7 dot matrix CRT.

The terminal employs a Motorola Semiconductor Products, Inc. 6800 microprocessor and comes with a 24-character keyboard consisting of 20 Codabar characters and four control functions.

The unit can contain a badge reader and provide a hard-copy record of key-entered and scanned messages when connected to a printer through its RS-232 interface, Monarch added.

The Comparison/Verifier Terminal costs $2,500, the firm said from P.O. Box 608, Dayton, Ohio 45401.

Hard copy made easy.

With the help of a high-speed microprocessor, Hewlett-Packard combines exceptional performance and convenience in a new low-cost printer and printing terminal.

The HP 2631A printer and HP 2635A printing terminal with alphanumeric keyboard are the first members of a new Hewlett-Packard family of hard copy terminals.

Each machine was designed to give you a number of high-performance features. And both can support a variety of interfaces, including RS232 and CCITT.V24, to fit into systems made by HP and other manufacturers.

Bi-directional printing increases throughput. Both printers zip along at 180 cps in both directions, depending on your line layout. The microprocessor chooses the quickest path, and increases the speed even more by suppressing leading and trailing blanks.

High-speed slew for columnar data. When the microprocessor senses more than ten blanks in a row, it slews the print head at 45 inches per second to the next print position.

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Three ways to print. The Character Compress/Expand Modes let you print more data on a page and emphasize points with headlines and titles. You can get as many as 132 characters on an 8-inch line, or 227 on a 14-inch line.

High-quality print, with six copy resolution. A 7 x 9 dot matrix (versus the usual 7 x 7) gives you clear, crisp printouts, right down to the sixth copy and meets the 128-character USASCII standard. And the extra two dot rows allow true underlining and descenders without character blurring.

Programmably interchangeable character sets. The HP 2631 can be made to print alternate character sets without reconfiguring the printer.

Long lasting, quick change print head saves service calls. The 9 wire print head is conservatively rated at a 100 million character life-span. It's also self-aligning. When you finally replace the head, you can do it yourself in a couple of minutes.

Long-life cartridge ribbon for a clean change. With a life span of at least 10 million characters, this innovative drop-in cartridge takes the mess and trouble out of ribbon changes.

Self-test for quick status checks. One key tells you if the printer is ready to go. If it isn't, the self-test feature helps you isolate the problem, reducing the time and cost for repairs.

Run everything under program control. All the features described and more can be programmably controlled. The software can take you in and out of the various modes. Or you can make a change yourself using one of the front panel switches or keys.

In a network or as part of a stand-alone system, HP now makes it simple to get the hard copy you need. If you'd like to see our printer or printing terminal in action, call the Hewlett-Packard sales office listed in the White Pages and ask for a computer systems representative. Or send us the coupon.

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Seminar to Eye 'IBM: The Next Five Years'

NEW YORK — The Yankee Group will offer a seminar here Oct. 24-25 on "IBM' The Next Five Years in Automated Systems Integration." The seminar will examine IBM products and IBM marketing strategy, a spokesman said..

"IBM's virtual monopoly in the DP and office automation marketplaces has left it with a large, diverse user base — a base that will be offered a wide variety of options during the next five years," he said.

"Products with innovative architectures and universal interfaces will have to be developed if IBM is to sustain its hegemony, notwithstanding incursions from AT&T, Exxon Enterprises, the mini makers and the plug-compatible people," he added.

"It is now apparent that [IBM] is moving into the 1980s with an entirely new generation of computers, peripherals, communications systems and office equipment . . . This evolution, which will surpass the 360-to-370 migration of a decade ago, is the focus of [this] seminar," which will be held in the Harvard Club at 27 W. 44th St.

The cost of participation is $550 for the first registrant of a team and $450 per person for additional team members, The Yankee Group said from P.O. Box 43, Harvard Sq., Cambridge, Mass. 02138.

TP Monitor Gives Added Access

(Continued from Page 39)

ate the communications problem. They also wanted to upgrade the computer itself so it could operate in an on-line mode.

But "I couldn't find anything off-hand," Weatherly recalled. "With our 360 equipment and the size ranges that we had, we found that it wasn't possible with existing software."

Finally, after what Weatherly called "a less than exhaustive search," company officials discovered that a local firm, GBA International, was working on a TP package that seemed to suit the chemical engineering company's particular needs. The user decided to implement the system, consisting of a GBASwift, the TP monitor, the GBA's on-line programming package.

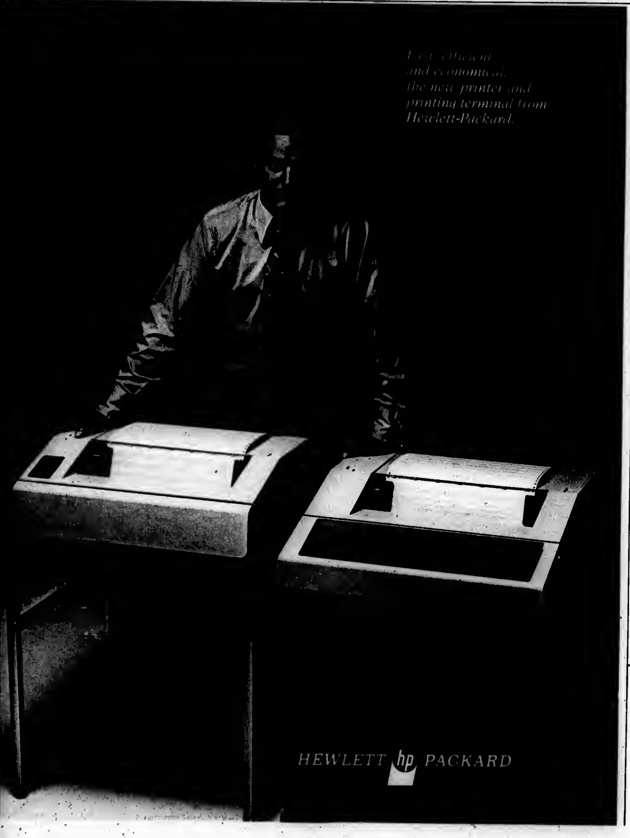
An additional IBM mainframe, a 256K-byte 360/40 running under DOS, was brought in both to ease the increased programming workload and to support the proposed on-line system. The Model 40 interfaced with the original and primary system, the 360/30, through a Model 2314 disk drive.

Although both machines shared the 8M bytes of storage on the disk, they ran relatively independent of one another, Weatherly pointed out.

The current on-line system handles up to 70 engineering runs each day and brings the computer closer to those people who use it the most. "The engineers now have a 'hands-on' capability with the computer and they can move ahead with their work without being dependent on the DP staff," Weatherly said.

D.M. Weatherly is basically satisfied with the monitor and its operation, but will eventually add a switching unit to the two systems and expand the primary system's core memory. "That way, if hardware problems occur, the system could switch from one machine to another," Weatherly explained.

The TP system required little from Weatherly's engineering staff in the way of training and orientation. "Once you've been introduced to the system, it's pretty much self-explanatory," Weatherly stated. "I really had only one programmer working and he was doing the on-line stuff."



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LARGE CONFERENCE FEATURES 30 SESSIONS - OVER 100 SPEAKERS

TUESDAY, NOVEMBER 7

9:30 A.M. — Noon

1 **HOW TO COMPUTERIZE A SMALL BUSINESS**

Organizer/Chairman Joe Glover — Electronic Data Systems

This session will address the major steps in computerizing small businesses. The major components of a small business computer acquisition (hardware, software, training, and maintenance) will be discussed. Examples of small business systems installations will be analyzed.

2 **MICROPROCESSORS IN DATA COMMUNICATIONS**

Organizer/Chairman Sherban Popovici — Timeplex Inc

This seminar examines the demands placed on data communications products by the explosive growth in computer communications, and focuses on the enhanced capabilities of these products made possible by the advent of microprocessors. The advantages, and occasional drawbacks, of microprocessors in data communications are illustrated through specific examples drawn from current applications and projected future requirements. This seminar will conclude with a panel discussion by representatives from the leading companies in the field.

3 **SEMICONDUCTOR IMPACT ON COMPUTER SYSTEMS**

Organizer/Chairman J. Egil Juliussen — Texas Instruments, Inc

An overview of current and future semiconductor trends is presented — including microprocessors, RAMs, ROMs, CCDs and bubble memories. The impact of semiconductor technology on processors, mass storage, terminals, peripherals, and systems architecture is previewed from historical perspective and future evolution.

4 **PERIPHERALS IN OEM SYSTEMS — LOOKING AHEAD**

Organizer/Chairman Randy Knapp — Wespercorp, Western Peripherals Division

Market overview and predictions as to what the future might hold, followed by the economic climate, and how it might reflect on future independent business efforts in the area of mini- and micro-computer peripherals. What the future, over the next five years, will hold for hardware, with the session dealing finally with the problems of integrating hard peripherals to the software system and how this may affect the industry in future years.

5 **NETWORKED MICROCOMPUTERS IN PROCESS CONTROL**

Organizer/Chairman Gary D. Johnson — Process Computer Systems, Inc

Networking of microcomputers has become a de facto standard method of solving process control problems. When analyzed closely, however, there are a myriad of methods by which microcomputers can be networked. The multiplicity of methods by which micro-computers can be implemented makes it difficult to select the correct technique for the application in question. This session gives exposure to actual working applications and experiences related to the implementation and an overview of network architecture today and in the future.

1:30 P.M. — 4:00

6. **CONSIDERATIONS OF MINICOMPUTER LEASING**

Organizer/Chairman: Neil Kleinman — International Data Corporation

7 **DISTRIBUTED COMPUTING**

Organizer/Chairman: Neil O. Kelley — Infosystems

Communications is a key factor in distributed computing. Interlinking of different protocols and architectures plays a major role in many systems. Distributed processing has a broader scope today; for example, some systems handling both word and data processing. Multi-function, multi-supplier systems require an understanding of communications.

8 **FUTURE HARDWARE TECHNOLOGY IN SMALL COMPUTERS**

Organizer/Chairman. Edward J. Bride — Desktop Computer, Div., Hewlett-Packard Co.

Much has been said about new applications of small systems, yet few people have been willing to address the hardware developments that will enable users to implement some of these applications. In this session, manufacturers and consultants look to the future and project some of the innovations which will be embodied in minicomputers, microcomputers, and desktop computers within five to eight years. Included in the last category are computers also known as "portable" computers, speakers will address "personal" computers as the term is used to describe single-user systems in business/administrative applications. "Hobby" computers will be considered under minis or micros.

9 **THE NEW IBM-COMPATIBLE MINIS — MARKETS AND APPLICATIONS**

Organizer/Chairman: William W. Orrange — Simon/Public Relations

Three industry leaders will discuss the newly introduced IBM 370-compatible minicomputers, their architecture, and where and how they will be used. Dr. Anderson and Mr. Siehl represent two of the firms that have announced these new generation minis, and Mr. McGuire represents a firm that has announced a complete business system based on the new minis.

10 **AUTOMATED MATERIALS HANDLING SYSTEMS: A REALITY WITH THE MICRO**

Organizer/Chairman: Frank C. Goodfinger — Computer Identics Corporation

An applications-oriented presentation of systems utilizing micro-processors for data acquisition and control in the materials handling environment. Individual presentations will address the impact the micro-processor has had on conveyor and automated storage and retrieval systems as well as product labeling and identification equipment. The primary focus will be on the cost effectiveness and operating benefits offered by strategic deployment of micro-based controls in manufacturing, warehousing, and distribution.

WEDNESDAY, NOVEMBER 8

11 **FROM SERVICE BUREAU TO IN-HOUSE DP — AND VICE VERSA**

Organizer/Chairman Mel Mandell — Editor, Computer Decisions Magazine

Converting from reliance on a service bureau to in-house DP — and vice versa — can be a trauma. Two executives who have experienced this trauma will tell, with no holds barred, how they coped. In addition, an executive of a service bureau will offer inside advice on how to handle these transitions.

12 **APPROACHES TO COMPUTER NETWORK TROUBLESHOOTING**

Organizer/Chairman Donald K. Wilkin — Hewlett-Packard Company

Since computer network down time is costly, maintenance organizations need to carefully develop their approach to network troubleshooting. A mistake in choosing the proper diagnostic instrumentation could be competitively unwise, if not financially disastrous. There are many different instrumentation philosophies for Computer Communication networks. With the proliferation of protocol analyzers now in the marketplace, there is a need for clarifying their basic differences. This session offers a forum for the major vendors to present their views and, hopefully, an opportunity for discussion.

13 **HOW TO CUT SOFTWARE DEVELOPMENT COSTS**

Organizer/Chairman Dave Bursky — Electronic Design

In the last five years, software costs have risen from 40% to about 80% of small-system development cost, as hardware prices kept dropping. No wonder many companies offer software development aids, but they often approach the common goal from different, even opposite, directions. Panel members — both vendors and users — will represent the alternatives: dedicated vs. cross systems — assembly vs. higher-level language — single vs. multiple users. After a brief presentation of each member's preferred approach, panel members will exchange views and answer questions from the audience. Find out which approach to software development is best for you.

14 **THE NEW GENERATION OF FIXED DISCS**

Organizer/Chairman L. S. Bleininger — Microdata Corporation

The first generation of fixed discs were introduced by the OEM suppliers shortly after the availability of Winchester Technology. These drives met a narrow range of applications, however, the second generation of fixed disc drives offer a wide variety of technologies, capacities, performance, and prices. This session is to review the alternatives available.

MICRO and MINICOMPUTER APPLICATIONS TO THE OILFIELD

Organizer/Chairman Kenny Bergen — N L Baroid

Technological and cost breakthroughs of mini and microcomputers have resulted in their being applied to all phases of the search for oil and gas. However, not all of these applications have been easy or successful. This session will present specific small computer applications in Exploration, Drilling and Well Logging. Basic user requirements will be outlined and the unique problems of adapting fast paced computer technology to the conservative oil patch will be discussed.

16 **KEYS TO SUCCESS IN SELECTING AND INSTALLING A MINICOMPUTER**

Organizer/Chairman: John P. Gallagher — A.D. Smith Corporation, DSD

Business and industry have been attracted to the Minicomputer because of its lower price and technology. However, the impact of the computer is still felt throughout the organization. Business functions have to be mechanized, data needs to be disciplined, cost application benefit priorities should be identified, and proper implementation of activities must be accomplished. Considerations must be given as to where the minicomputer should fit into the organization and who should control this new tool. The experience of the main frame firms can be of some help. Technology and the mini/micro computers make some business applications now feasible to mechanize. New sources of control and profitability are now possible! Let's explore those KEYS TO SUCCESS. Our session will share experiences and "lessons" to be learned with attendees. The result will be rewarding for those people who will be using a minicomputer in a business environment.

17 **BUSINESS ASPECTS OF MINICOMPUTER DISTRIBUTORSHIPS**

Organizer/Chairman: William McNamara — Randal Data Systems, Inc.

The small business computer market is ready, but are you ready for it? It is not enough to meet the financial requirements, to have the right technical expertise available, and to be able to produce sales volume. You must ask yourself a number of other very important questions. For instance, (1) How do I get started? (2) What Manufacturer elements should I look for? (3) Do I have the stamina and drive to make a venture successful? (4) What do I really want to do? The answers to these questions and many more will determine your success.

18 **PASCAL ON MICROS AND MINIS**

Organizer/Chairman Winsor Brown — General Automation, Inc.

Pascal, a relatively new language on the mini and micro scene, is the most widely acclaimed programming language in software engineering circles. The benefits and features of Pascal will be highlighted. Several implementations of Pascal on micros and minis will be discussed, including the one from UCSD Institute for Information Systems. General information about the state-of-the-art of Pascal on small computers will be provided along with information of workshops for systems programming extensions to Pascal.

19 **EXTENDED DISK MEMORY FOR MICROS AND MINIS**

Organizer/Chairman Keith Winton — System Industries

This session will deal with the use of OEM peripherals — in particular, disk memories — in minicomputer and microcomputer systems. It will help attendees learn how to save money ordering such equipment, as well as how to use it and what pitfalls to avoid. Individual papers will focus on unique, real-life applications, especially to high performance systems seen to be extending the boundaries of minicomputer capabilities.

20 **IMBEDDED MICROPROCESSORS IN MILITARY AND INDUSTRIAL SYSTEMS**

Organizer/Chairman: Leo A. Chamberlin — Texas Instruments

The mini/microcomputers being developed by private industry offer the opportunity to increase capability and lower cost of weapon systems. There are many problems, however, to incorporating commercial products in military systems, including licensing of software and hardware, assurance of long term availability. These problems will be addressed by a panel of military and industrial personnel.

THURSDAY, NOVEMBER 9

21 **HUMAN ENGINEERING ASPECTS OF DATA ENTRY — THE PROBLEMS AND SOLUTIONS**

Organizer/Chairman: Dr. Malcolm G. Lane — Software Systems, Incorporated

It is well known that without correct data, the value of a computer system greatly diminishes. Since the majority of errors in data result from incorrect entry, data entry is an extremely important part of all computer installations. This session concentrates on the human engineering aspects of designing data entry systems and includes discussions of the problems and solutions of designing such systems. A discussion of data validation/verification techniques is also included.

22 **BUSINESS, ENTREPRENEURIAL, AND INVESTMENT OPPORTUNITIES IN MINIS AND MICROS**

Organizer/Chairman Stanley Klein — Mini-Micro Systems

To examine the financial significance arising from the mushrooming opportunities in applying minis and micros to business, industrial, and home applications. Speakers will address emerging hardware and software opportunities for systems and software houses, entrepreneurs, individuals, and small established companies, as well as the investment opportunities for those wanting to support such activities financially. Most important, the session will cover the pitfalls and problems to be encountered and also discuss examples of successful enterprises. Session Chairman Stanley Klein is especially interested in this aspect of the mini-micro world both as editor-in-chief of MINI-MICRO SYSTEMS magazine and as previously a department editor at BUSINESS WEEK magazine, responsible for "Busyweek's" coverage on new product innovation. Mr. Klein also writes on computer topics for the Sunday New York TIMES business section.

23 **APPLICATIONS PROGRAMMING LANGUAGES**

Organizer/Chairman. Winsor Brown — General Automation, Inc

The major applications programming languages such as FORTRAN, COBOL, Pascal, BASIC, and PL/1 will be presented. The features of the languages presented that make them oriented towards given application areas will be identified by each presenter. Particular emphasis of each presentation will be the methods used to get the usually large, high-level languages into and onto smaller and smaller computers. Only recently, have mini and/or micro computer implementations of COBOL, PL/1, and Pascal been demonstrated. While the presenters will probably be implementers, it is hoped that feedback during the discussion period will provide insight into user experiences with these high-level languages on minis and micros.

24 **MINICOMPUTER TAPE SUBSYSTEMS**

Organizer/Chairman. Clark Hollingsworth — Datum

25 **GROWING IMPACT OF THE MICROPROCESSOR ON COMPUTER GRAPHICS**

Organizer/Chairman Carl Machover — Machover Associates Corp

Microprocessor-based or influenced computer graphics devices are beginning to dominate the graphics market. Microprocessors provide significant stand-alone capability in addition to simply replacing hardwired controllers. A $30,000 interactive drafting system, several stand-alone graphic desktop computers, a high-performance vector-refresh display system, a laser high-speed automatic digitizer, and a plotter and digitizer each costing about $1,000, will be described in this session.

26 **WORD PROCESSING — AN INTELLIGENT APPROACH WITH A DP FUTURE**

Organizer/Chairman: John Hansen — Infosystems

A fresh look at mini/microcomputers in word processing systems and how they're changing life in the office. A panel of users and vendors will discuss the convergence of word processing with data processing, highlighting such topics as: the systems involved, the people who run them, the resulting economies and fulfilling management's needs. Among other management concerns, the role intelligent word processors are expected to play in the overall corporate information structure will also be explored.

27 **HOW TO GET STARTED AS A SMALL SYSTEMS ENTREPRENEUR**

Organizer/Chairman: Phillip J. Sabol, Corporate Planning and Finance

A "HOW TO" approach that zeros in on the critical aspects of the small entrepreneur's search for funds (debt or equity). The Business Plan . . . How to Prepare it; The Presentation . . . Maximizing Your Potential, The Lender . . . How He Evaluates Your Request, Sizing up the Market, What's Happening in the Market, Small Business Opportunities, Competition and Survival, How to Sell to the Marketplace; Pre-requisites and a Game Plan.

28 **THE FUTURE OF APPLICATION SOFTWARE FOR MINICOMPUTERS**

Organizer/Chairman: Alistair MacDonald — Hewlett-Packard, DCD Division

29 **PRINTERS**

Organizer/Chairman: Julian St. John — Dataproducts

30. **ADD-ON MEMORIES**

Organizer/Chairman: William Knack — Electronic Memories and Magnetics

NOTE: **Each session will consist of 3 – 4 Speakers**

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Adds 'Visibility' to Operations

System Helps Drive to Engine Works

WATERLOO, Iowa — The problems of running an assembly line which produces large diesel engines are manifold, but they increase even more when the assembly plant covers nearly one million square feet, is more than a third of a mile long and houses hundreds of workstations.

To ease the problem, the John Deere Engine Works of Deere & Co. here installed an IBM 370/168 to process the data as smoothly as the firm produces the engines. CRTs connected to the system are located throughout the plant for use by management and supervisory personnel. The 6M-byte system runs under MVS and uses JES-3 and Information Management System (IMS).

"The payoff from this approach has been impressive," according to Francis Pardoe, manager of the Waterloo engine plant. "The swift and versatile computer communications system provides needed visibility of plantwide activities — what's happening, where, when, why.

"The system supports better management decisions at all levels," Pardoe said, "and promotes smoother operations from raw material receipt to finished product shipment. The net result is higher productivity at lower production cost."

The 168 — one of two in use here — is connected to an IBM System/7 located on plant premises. That system, in turn, is connected to more than 100 IBM 2790 data collection units throughout the plant work areas.

As work moves through the plant, the data collection units report progress and performance. The small plant computer accepts the entries, edits them, stores them and passes them along to the 168 control computer, which updates affected master file records to reflect current status.

The updated file information becomes immediately available on the CRTs, completing the continuous control cycle.

Everyday Involvement

Involvement of the computer communications system in everyday plant operations is remarkably broad and deep, Pardoe said. "It is the key to production scheduling, engine lineup and assembly line balancing.

"It tracks materials, parts and engines through all manufacturing steps; records labor and product costs; pinpoints inventory and storage locations, and reports work performed and workload queues by workstation. All along the line, it keeps management informed of where we stand and how we're doing," he explained.

Information closely parallels work. On the production end, for example, computer involvement begins with the basic engine lineup. This is the schedule that outlines what orders, engine models and sizes are to be produced and in what sequence.

The schedule extends over a 15-day period, but the specific engine lineup is set daily via a "conversation" between the production scheduler, who uses a CRT terminal, and the computer.

The scheduler at the terminal can call up a display of all lined-up orders for a particular engine model or for all lined-up engines for a particular date. A particular engine or a group of engines from one particular "build sequence" on a specified day and assembly line can then be moved to another build sequence on another day or to a different build sequence on the same day.

Lineup additions and changes can be entered, line spacings can be altered, holds can be placed on a single engine order or group of orders and another order or series of orders can then move into the vacated schedule slots.

With the engine lineup established, the system moves into a line-fill program, using the bills of material for the lined-up engines to determine parts requirements for the assembly line. Here the computer employs a storage control data base to determine inventory availability and locations and to issue pick lists for movement of the needed parts and materials to the assembly line.

The objective is to expedite delivery of the correct engine parts to avoid line slowdowns or stoppage and to prevent inventory over-

(Continued on Page 48)

Large-Scale System Helps Keep Hi-Fi Maker Abreast of Orders

By Tim Scannell
CW Staff

MOONACHIE, N.J. — Sophisticated inventory controls, multimillion-dollar marketing programs and advanced computer technology are all virtually worthless if a firm's customers aren't eventually satisfied. This is particularly true in the "highly volatile" and competitive hi-fi component business, according to Barry Shereck, vice-president of finance for the U.S. Pioneer Electronics Corp.

Pioneer manufactures everything from portable radios to complex stereo receivers and sells its wares from more than 5,000 independent retail outlets scattered across the country. The firm recently installed an IBM 370/138 on-line computer system to keep up with customer demands and to try to remain one step ahead of an army of competition.

"When a customer decides to buy a stereo system, he won't wait for a store to get delivery on a particular system," Shereck explained. "He wants to play his music today. This means we always must have a full inventory available for our dealers."

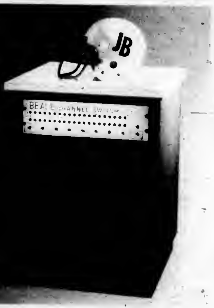
The computer, located here at Pioneer's headquarters, controls inventory by monitoring each dealer's distribution and purchase patterns. The system also relieves a certain amount of credit-related "back-order chaos," Shereck said. "Because our industry is credit bound, most dealers are operating at their credit limit . . . and the system enables us to have a central data bank to make credit and product decisions very quickly."

Dealers order equipment through either an independent sales representative or directly from one of Pioneer's four sales offices. The sales offices, located in Los Angeles, Dallas, Chicago and New Jersey, double as warehousing operations, and operators there enter inventory and order information into the central computer via IBM 3770 data communications stations.

"The computer then tells [the operator] what merchandise is shippable, what is back-ordered and whether the equipment is credit-released," Shereck continued.

If the equipment is not credit-released or paid for in advance, the order is transferred to a credit hold file, and the information is passed to the firm's New Jersey credit office. "That office reviews the customer's file and tells the dealer the order will be released pending the receipt of a check," Shereck

(Continued on Page 46)



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We make five basic models to provide up to eight switchable interfaces each of which can be logically connected to as many as eight CPUs.

Oh yes, one more thing. Our "quarterback's" contract is the lowest in the league.

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System Keeps Hi-Fi Maker Abreast of Orders

(Continued from Page 45)

said.

Pioneer also uses the system and its day-to-day method of recording transactions to plan marketing strategies and sales programs. "Previously, we wouldn't know how well we did in a month until probably 10 days after the month closed," Shereck noted.

"Now, we know what's happening because all the transactions are always in the computer," he explained. "We know where we are and what kind of paperwork and product flow we're facing."

Mini to On-Line

The electronics firm originally used a minicomputer system — on a limited basis — for sales reporting, accounts receivable and cooperative advertising, Shereck stated. It then upgraded to a non-IBM mainframe which was subsequently scrapped because of poor equipment response times and negative support from an outside supplier. Finally, the firm contacted IBM and the present system was constructed.

"No one really knew what kind of computer we were going to need or what our needs were going to be," Shereck pointed out. "We were really starting from scratch."

Initially, IBM recommended a 370/125 Model 2 but, after reviewing the company's needs and goals, reversed its opinion and installed the current 138. The system has 1M byte of memory, uses a disk operating/-virtual memory storage system, and runs under Systems Network Architecture (SNA) with Synchronous Data Link Control (SDLC) under the Virtual Telecommunications Access Method (Vtam). Remote job entry (RJE) and system program maintenance (SPM) capabilities are also included in the system's architecture.

Employee Reaction

Aside from the obvious technical problems associated with building a system from scratch, the computer's introduction met with a certain amount of psychological resistance from the employees.

"Our people who lived through the first computer's failure with us were initially very disappointed." A lot of rumblings were going on, and people were concerned about losing their jobs, Shereck observed.

"There was some trepidation when the computer went live that we were going to run it for six months and then start lopping off heads," Shereck noted. However, "we're a very close-knit company in many, many ways and we told them right from the beginning they were not going to lose their jobs because of the computer. They knew we weren't conning them and given the trust that exists in this company, they believed us," Shereck said.

The computer not only caused Pioneer, a medium-sized company, to operate like a much larger firm, Shereck explained, but also incited a "real management revolution." "Nobody could really 'snow' anybody else because we all had the same information. Nobody was going to hold back orders until the end of the month, show a big peak, and pretend to be a hero," Shereck stated.

The secret of Pioneer's successful transition from a manual inventory system to a computerized one was the complete involvement of everyone from "the most senior levels down to the bottom" and "no surprises," Shereck commented. "Everyone knew what to expect, what was coming and understood what was happening before we installed the first terminal."

Powertec Adds Switching Units

CHATSWORTH, Calif. — Powertec, Inc. has introduced 10 models of single-output 250W and 400W switching power supplies, extending the company's Superswitcher series.

The units introduced include outputs of 2V, 5V, 12V, 15V and 24V; each is available in 250W and 400W units.

Every unit has undergone a 24-hour, elevated burn-in testing procedure on all electrical parameters for product reliability, according to the company.

The units feature soft-start circuitry, a logic inhibit function and overload and overtemperature protection, Powertec said, adding that the series features a motherboard design that eliminates internal wire harnessing, providing increased reliability.

Packaged with a built-in cooling fan, the supplies feature remote programming and a maximum 30 msec energy storage in the event of brief power failures, the company noted. This permits orderly system shutdown, a spokesman added.

Prices for the 250 unit start at $450 and the 400W units start at $550, Powertec said from 20550 Nordhoff St., Chatsworth, Calif. 91311.

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Means Lower Cost Systems

CCD/RAM Chip Seen Prevalent in 10 Years

Special to CW

LOS ANGELES — Within 10 years systems engineers will be less dependent on the use of dynamic random-access memory (RAM), thanks to the use of a single chip that combines both RAM and charge-coupled device (CCD) memory, according to Doug Powell and Ian Le Mair of Motorola, Inc.

This increased use of CCDs will bring lower systems costs without impacting performance, but will require changes in the structure of software to capitalize on intelligence in a hierarchical memory system, they told a session on the impact of new memory technologies at the recent Western Electronic Show and Convention (Wescon) here.

CCDs are taking their place in the hierarchy of memories between bulk storage and main memory (RAM). Eventually this hierarchy will change, reflecting the absorption of what is typically now considered main memory into the CCD arena, they said.

"This will happen as the interaction between the CCD memory and the RAM main memory are combined on a single RAM/CCD chip," they explained.

The chip could also "contain the control logic necessary to make this combination appear as a large RAM-only chip. The internal RAM would act as a buffer or 'cache' for the CCD."

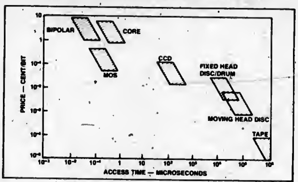
Such a hybrid's performance would offer an average access time of about 100- to 300 nsec, which is compatible with today's main memory speeds. The chip could contain 1M bit or more and have the low power dissipation of CCDs, they continued.

Basically, Powell and Le Mair envision a system that has three types of memory, each with its own control. All memories would share a memory processor.

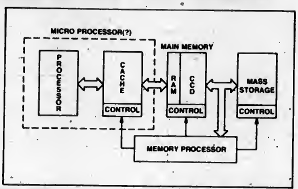
The CPU, which could be a micro, would have a cache; the main memory would be the RAM/CCD hybrid; the third type of memory would be mass storage.

	MOS RAM	CCD MEMORY
ACCESS TIME	150-350 nSEC.	100-800 μ SEC.
TRANSFER RATE	2 MEGABITS/SEC.	1-5 MEGABITS/SEC.
TYPICAL STORAGE CAPACITY	16K-BITS/CHIP	64K-BITS/CHIP
READ ERROR RATE	$10^{-11} - 10^{-13}$	$10^{-11} - 10^{-13}$
MTBF (HOURS)	7000	7000
NON-VOLATILE	NO	NO
COST/PER BIT	70 MILLICENTS	35 MILLICENTS

CCD vs. MOS RAM Performance Characteristics

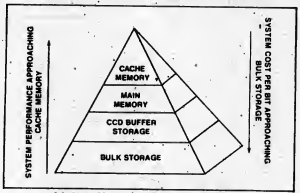


Price/Performance Characteristics



Charts Courtesy of Ian Le Mair of Motorola, Inc.

Structure of Future Systems With CCD/RAM


SYSTEM PERFORMANCE APPROACHING CACHE MEMORY
CACHE MEMORY
MAIN MEMORY
CCD BUFFER STORAGE
BULK STORAGE
SYSTEM COST PER BIT APPROACHING BULK STORAGE

Memory Hierarchy of Computer Systems

Fast Buffers

In the current hierarchy of memories, CCDs can be used as fast buffers between moving-head and floppy disks in applications such as intelligent terminals.

Powell and Le Mair estimated that in the small business computer category of processor — those priced at $2,000 — where cost is a key consideration, the ratio of CCD to RAM devices may be about 4:1.

Higher-Bit Density

CCDs are about eight years old, having been born at Bell Laboratories.

Reliability equals that of RAMs; improvements made in RAM processing, manufacturing and design can usually be directly applied to CCDs.

But CCDs can achieve higher bit density and lower cost per bit than RAM. They have higher yields because of the absence of metal lines or contacts in the array, Powell and Le Mair explained. The lack of "active" elements contributes to higher densities.

The density of CCDs is currently, and probably will continue to be, about four times greater than that of RAMs. Almost here are 64K-bit RAMs and 256K-bit CCDs are expected next year. In four years there should be 256K-bit RAMs and 1M-bit RAMs and 1M-bit CCDs.

CCDs fit squarely in the price/performance gap between main memories — bipolar, MOS and core — and bulk storage devices such as tape and disk. Current CCD chips have a cost of about 30 millicent/bit, they said.

But the problem with substituting CCD for bulk storage is that CCDs are volatile, they noted.

For RAM replacement applications, CCDs are cost-effective for applications that don't require high-speed memories, but are more sensitive to cost and packing density, they remarked.

Ebam Predicted Next Wave Of Memory Technology

Special to CW

LOS ANGELES — It was not too many years ago that attendees at the Western Electronic Show and Convention (Wescon) heard charge-coupled devices (CCD) and bubbles described as the next wave of memory technology. Those devices are now a fait accompli, and the challenge to fully utilize their capabilities has passed from the laboratory to the systems designer.

But what about the future? Commercial electron beam accessed memory (Ebam) systems can be expected in the early 1980s, Donald O. Smith of Control Data Corp. said here recently at the latest Wescon.

Young later substantiated his claim by remarking that several large companies have spent $150 million to develop bubble technology. Not one-twentieth of that has been spent on Ebam, he said, adding an infusion of dollars would most certainly push not only Ebam out of the laboratory, but the next generation of memory as well.

In optics, two stages of deflection are used to access 100 to 1,000 times more resolvable spots than was possible with one stage.

Zero Access Time

Ebam can be very fast and may be considered from a system point of view as a nearly zero access time, high data rate disk, Smith commented. As such, it could find use as a disk replacement, as a cache for a disk, a staging memory and as a direct access memory, he indicated.

Currently it is possible to make an Ebam with tubes having 1G bits with an 80 microsec access time.

Looking to the future, Smith suggested it may be possible to package 4G bits in a tube 1 in. in diameter and 2 in. long.

The per-bit storage cost should be less than for disk and because Ebams are nonvolatile, they could replace disks, he said.

However, there are problems that require special data management. For example, the target "fatigues" and has a limited lifetime when irradiated with an electron beam. Also, there is no threshold at which charge is stored or removed from the target, Smith said.

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Engine Works Gets DP Horsepower Boost

(Continued from Page 45)

loading at the assembly line stations.

Every engine in the lineup is tracked via the on-line data collection system as it moves through the assembly stages, from the time the machined engine block is hung on the assembly line until the finished engine is deposited in the warehouse for shipment. Current engine information is instantly available by terminal inquiry which can be made by engine, department or model number.

In addition, the tracking program provides inquiry capability on missing engine parts by serial or part number.

"The control benefits on the engine lineup, line fill and engine-tracking routines are obvious," Pardoe declared. "We know which engines are to be built, when and in what sequence. We know if the required parts are available and where they are located.

"We can determine the status of any or all engines in production, at any stage of production — on the assembly line, built, tested, trimmed and painted. And we can put our finger on actual and potential problem areas, such as missing parts, test failures, or line bottlenecks," he noted.

Materials Control

Control advantages are also impressive on the materials side. Here computer involvement starts with receiving incoming material which is controlled from the time it arrives on the dock until delivered to work-in-process departments. The terminals provide for on-line receipts reporting and inquiry.

A pervasive materials tracking system keeps tabs on material movement across production operations. The on-line data collection units on the shop floor come into play once again, as they are used to report material receipts into key plant departments.

Data collection terminal entries also feed the shop floor monitoring system to update a running record of parts produced, scrap and "hold" parts by workstation. Inquiries can be made to determine all parts in process in a particular department, the quantity available and the quantity on "hold" for each operation by any part number, the parts produced and workload remaining by workstation.

"The exceptionally tight control over inventories, especially work-in-process inventories, is a major contribution of the on-line computer communications system," controller Carl Krell said.

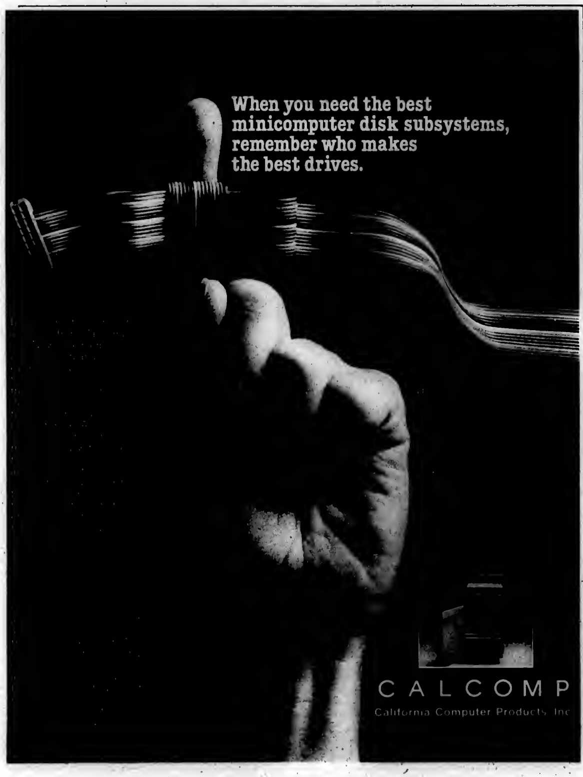
"We are in a better position to evaluate overall materials and parts inventories, and we can act more swiftly to utilize 'hold' material. As is typical for new plants, our inventories of materials and parts have been growing as the plant production rate has increased. However, stocks are leveling out now, even declining in some areas. We're convinced the on-line information system will result in a lower inventory investment," he said.

The same information fed from the plant data collection terminals also makes an important contribution to better control of labor costs and better labor reporting, according to Krell. "Workers use the 2790 terminals to report attendance, job assignments and incentive labor hours for each operation. The system also permits crew reporting and changes of assignments or departments."

It would be difficult to find a department or operating area at the John Deere Engine Works where computer communications does not play a significant role. In manufacturing engineering, for example, the on-line system collects and disseminates information concerning machines, tools, gauges, fixtures, labor operations and their relationships to each other. Manufacturing engineers can inquire via terminals for up-to-date information on the plant wide status for either tooling or operations, including where-used data or current incentive standards by department.

"The John Deere Engine Works was designed to be a special kind of manufacturing facility right from the start," Pardoe said.

"On-line computer communications provide information that keeps pace with the work, preventing counterproductive decisions and eliminating any confusion on the part of management at all levels. Without them, the plantwide visibility that is so essential to effective planning and control is severely impaired," Pardoe concluded.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BTI Replaces 4000 Time-Sharing Series

By Jeffry Beeler
CW Staff

SUNNYVALE, Calif. — Enhanced software and a more than threefold increase in mass storage reportedly constitute the chief user advantages of Basic Timesharing, Inc.'s (BTI) replacement for the firm's Model 4000 time-sharing systems family.

In a basic configuration, the replacement — the Model 5000 — incorporates a 29M-byte nonremovable disk unit, whereas a basic 4000 sytem provides a 7.5M-byte disk unit. Yet despite the expanded mass storage, the 5000 costs only $3,000 more than its predecessor, according to a BTI spokesman.

Among its other enhancements, the 5000 sports a modified version of the 4000's time-sharing executive. One of the main improvements to the revamped executive is a sort function that is callable in Basic-X, BTI's extended Basic, but that runs in machine language.

With this software feature, the 5000 can sort up to 30 times faster than with standard Basic — a capability that reportedly lends the system to inventory control, data base management and other business functions requiring frequent sorting.

In processing power, the 5000 equals the 4000 and falls approximately midway between the Hewlett-Packard Co. Model 2000 and 3000 systems, the source explained. The BTI system will also compete with the Digital Equipment Corp. PDP-11/70, although it will provide less processing power than the DEC equipment.

Basic Timesharing, Inc.'s Model 5000

Front-Panel Design

In addition to providing an alternative time-sharing executive and disk capacity, the 5000 differs from the 4000 in CPU front-panel design and communications multiplexer features.

Although both the 5000 and 4000 are built around an HP 21MX processor, the replacement system offers a set of front-panel switches not available with the earlier product line. With these additional controls, users can perform diagnostics automatically, even during system shutdowns, the spokesman explained. The 4000 family lacked the automatic diagnostics feature, he added.

BTI also redesigned the 500's multiplexer to accommodate

(Continued on Page 50)

Left Hanging by Ailing Vendor, User Gets Help, Finishes System

NEW YORK — The story reads like an end user's nightmare. Garrick-Aug Associates Store Leasing, Inc. contracted with a local hardware distributor to develop and install a $250,000 turnkey minicomputer system to help the user match area retail locations with the store needs of retail chains and privately owned retail outlets.

Michael Hirschfeld, board chairman of Garrick-Aug Associates, accesses the store-location file stored in the company's Reality mini.

But before it could complete the installation and develop the necessary software, the vendor suddenly announced it was on the financial "skids" and about to declare bankruptcy.

Faced with the disastrous prospect of losing its large minicomputer investment, Garrick-Aug went in desperation to another local hardware distributor, Turnkey Sales & Leasing, Inc. (TSL) for help.

Happy Ending

Fortunately for the store leasing specialist, the potentially calamitous story ended happily. TSL completed the stalled installation, developed and debugged the software and arranged a favorable lease through one of its divi-

(Continued on Page 52)

Structured Plan Lets Users Rent Series/1 by Month

NEW YORK — Users can now rent Series/1s under a structured program that its developer suspects is the first plan of its type to cover IBM minicomputers.

"We don't know of anyone else who will provide a complete IBM Series/1 software-hardware installation with no strings attached," according to David Mack, chairman of DDP Products, Inc., the program's developer. Mack credited the plan with making the minicomputer sytsems "as simple to obtain as a rent-a-car."

Under the plan, DDP Products will rent Series/1 hardware, software and maintenance pack-

(Continued on Page 50)

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Single-Board S-100 Bus Processor Boasts Mini-Like Capabilities

PRINCETON, N.J.— Minicomputer capabilities and microcomputer packaging are combined in a single-board S-100 bus processor built around a Z80A microprocessor, according to a spokesman for Xitan, Inc., the product's manufacturer.

Capable of switch-selectable 2- or 4 MHz operation, the ZPU-2 is said to be compatible with Xitan's K series memory modules, which the company introduced at the same time as the processor.

Minicomputer-like features available with the 8-bit processor board include the ability to map up to 1M byte of random-access memory and to support up to four concurrent tasks, the spokesman said.

The processor also comes with two integral options — a system support feature and a floating-point feature — that reportedly facilitate system expansion.

In addition to its memory mapping and multitasking registers, the system support option provides four direct memory access channels that permit I/O units to transfer 2M byte/sec, the source said. With functions like masking and prioritizing, the system's software provides interrupt control for eight input lines.

Math Functions Speeded

The floating point option, meanwhile, is said to speed mathematical functions up to tenfold. With this option, the ZPU-2 can perform mathematical functions while other tasks are in progress, the source explained.

Turning his attention to the K series memory modules, the Xitan spokesman credited the products with using standard 16-pin memory chips that accommodate up to 128K bytes on one S-100-sized board. The modules come in 32K-, 48K-, 64K and 128K-byte versions and use a digital delay line to control timing, he added.

A basic ZPU-2 costs $395. As separate items, the system support option and floating point option cost $279 and $499, respectively; together, the features sell for $699, excluding the board's cost.

A 32K-byte K series memory module costs $799; a 48K-byte version, $1,099; a 64K-byte version, $1,299; and a 128K-byte module, $2,599.

Both the K series and the ZPU-2 are available from Xitan at 1101-H State Road, Princeton, N.J. 08540.

Software, Storage Enhancements Included in BTI 4000 Replacement

(Continued from Page 49)

transmissions up to 9,600 bit/sec, four times faster than the previous system's communications.

Why did BTI choose to replace the 4000 with an alternative system? The corporate spokesman views the decision as an attempt to simplify maintenance of the company's time-sharing product line.

Unlike the 4000 family, which provided separate power supplies in each systems module, the 5000 incorporates only one power supply, which fits at the bottom of the system's cabinet. This redesign confines all the replacement system's generating equipment in one place and therefore improves ventilation of control and logic circuitry, CPU, disk controller and multiplexer, the source said.

As a result, the 5000 can operate in ambient temperatures as high as 90- to 95 degrees Farenheit, he added.

As with the 4000 product line, BTI designed its latest time-sharing system primarily as an "in-house, multi-user time-sharing resource," the spokesman said. Typical 5000 users will include commercial service bureau clients who want to convert to an in-house system and businessmen that plan to replace their batch processing computers with interactive models.

64K-Byte Maximum

In addition to a 29M-byte nonremovable disk unit, a basic 5000 configuration incorporates a CPU with 64K bytes of nonexpandable MOS memory, one 10M-byte cartridge disk unit and eight user ports. Users can expand the system's nonremovable disk capacity in 29M-byte increments to 58M-, 87M- or 16M bytes, BTI said.

Moreover, they can use 49M-byte removable-pack disk units in place of or in addition to the 29M-byte storage modules The 5000 system can support up to eight removable-pack units for a total capacity of 392M bytes, the spokesman said.

Optional peripherals offered with the system include a tape cartridge module, which accommodates one to four drives, and a choice of four line printer models ranging in speed from 300- to 600 line/-min.

A basic 5000 configuration costs $38,950, compared with about $80,000 for a realistic maximum configuration consisting of a 64K-byte processor, 100M bytes of disk storage, 32 user prots, 9-track tape unit and line printer.

Shipments of BTI's latest time-sharing system began last month from the company at 870 W. Maude Ave., Sunnyvale, Calif. 94086.

Structured Program Lets Users Rent Series/1 on Monthly Basis

(Continued from Page 49)

ages by the month with a 30-day cancellation option.

The plan applies, however, only to customers who acquire the Series/1 hardware with DDP Products' software offerings, which include the DDP/1 package, a communications-oriented file management and data entry system for distributed processing applications.

Under terms of the rental agreement, DDP Products will repair all malfunctioning Series/1 equipment at its own expense. Users, however, must pay all shipping and installation charges as well as all sales, use and property taxes resulting from rental or possession of the hardware.

DDP Products offers its Series/1 hardware-software package at both short- and long-term rental rates. At the one-month rate, the company rents its DDP/1 software for $325 per CPU. Rental costs of the associated hardware vary with the configuration.

At the three-month rate, the package rents for the basic price less a 10%/mo discount; at the six-month rate, for the basic price less a 20%/mo discount; at the one-year rate, for the basic price less a 40%/mo discount; at the two-year rate, for the basic price less a 50%/mo discount; and at the three-year rate, or the basic price less a 60%/mo discount.

DDP Products can be contacted at 31 E. 28th St., New York, N.Y. 10016.

'First Industrywide Analyses'

Users Group Commissions Benchmark Tests of Minis

BOULDER, Colo. — The Association of Small Computer Users (Ascu) has selected Real Decisions Corp. to provide what association president Hillel Segal claims will be "the first industrywide benchmark analysis of small computer systems."

Ascu, a minicomputer users group formed five months ago, will publish the results of the Stamford, Conn., firm's benchmark tests in the association's bimonthly newsletter as part of a continuing member service.

"We were able to contract for the study far sooner than we had anticipated as a result of the unexpected growth Ascu has seen since its inception," Segal explained.

Specific Benchmarks

The first benchmark analysis will focus on the most popular small systems models as determined by member requests. Those models include the IBM 5110 and assorted machines from Digital Equipment Corp., Wang Laboratories, Inc., Hewlett-Packard Co., Data General Corp. and Datapoint Corp.

In its benchmark tests, Real Decisions — which performs a similar service for Ascu's sister organization, the Association of Time-Sharing Users — will relate the performance of selected systems according to three criteria: speed of repeating computing tasks, time needed to run user programs and ease with which editing software can be used, Segal said.

Likening the analyses to automobile tests, the association president observed, "The first, repetitive tests might be called the 'drag races.' They will be performance tests to determine the actual speeds of short, repeated operations."

The "road race" phase of the evaluation will test computer performance for specific user program.

Subjective Tests

The third and final phase of the benchmark tests will be more subjective than the first two and will rate the "handling ability" of the competing systems' editing commands, Segal added, concluding the road race analogy.

Ascu will publish the results of the first benchmark tests — involving the 5110 — in November.

Ascu can be contacted at 75 Manhattan Drive, Boulder, Colo, 80303.

'Automated Office' Built Around 8080A

ARLINGTON, Va. — All the hardware and software needed for an automated office are reportedly available with a microcomputer-based business system from Applied Microsystems Division (AMD) of Operational Systems, Inc.

The Automated Office incorporates AMD's 8080A-based Micromis microcomputer, a 64K-byte random-access memory, integrated dual floppy disk units, a Lear-Siegler, Inc. ADM-3A CRT terminal and a Nippon Electric Co. Spinwriter printer. It also provides two software packages — one a financial management and accounting (Finmac) system, the other a text processing system.

Finmac, a double-entry accounting system, consists of integrated software modules for payroll, accounts receivable, accounts payable, general ledger, cash receipts and disbursement and financial report generation.

The system's text processing software, provides modules for text entry and storage, character and text-block editing, text-block manipulation, global editing functions, document printing, personalized letter production, mailing label printing and list indexing.

Prices of the Automated Office start at $14,300. AMD is at 3140 N. Washington Blvd., Arlington, Va. 22201.

Cartridge Disk Controller Emulates DEC's RK-11

SANTA CLARA, Calif. — A cartridge disk controller from Xebec Systems, Inc. emulates the Digital Equipment Corp. RK-11 system and allows users to interface up to four 20M-byte disk units to the DEC PDP-11 and LSI-11, according to a Xebec spokesman.

Capable of plugging into the DEC Q-bus and Unibus, the Quad controller is plug compatible and software transparent with the RK-11 and is media compatible with the RK-05, the source said.

Xebec reportedly offers the single-board controller as a stand-alone unit, as part of a single-drive system or with multiple 5M-, 10M- or 20M-byte disk systems.

Built around the Xebec X2 bipolar microprocessor, the quadwide controller incorporates an 8-word first-in first-out to synchronize processor and disk timing.

With minor changes to the RK-11's software drivers, the unit is said to support disk systems that rotate at up to 2,400 rpm, record as many as 2,200 bit/sec and provide up to 406 cylinder/drive with 4- to 8 track/cylinder.

The Quad costs $2,800 without disk units and $9,100 with one 20M-byte system. Xebec is located at 2985 Kifer Road, Santa Clara, Calif. 95051.

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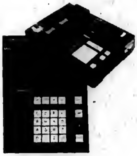
Programmer Facilitates Prom-to-Prom Transfers

MONTEREY, Calif. — Data can reportedly be transferred from one type of programmable read-only memory (Prom) to another with a Prom programmer from Pro-Log Corp.

Using a 2K x 8 CMOS read/-write buffer memory, the M900B control unit can retain data in storage for as long as one minute after the loss of ac power, according to a Pro-Log spokesman. This retention allows users to remove one Prom personality module and replace it with another.



Pro-Log Corp.'s M990B

It also lets users switch buffer memory for direct Prom-to-Prom copying, the source added.

With the buffered unit's ability to retain data without power, users can load data into the buffer and verify it before programming begins. Because of the M900B's uninterrupted serial bit stream operation, users can also boost their communications speeds with the unit supplying the programming data, the spokesman explained.

In addition to allowing data to be moved from buffer to Prom, the M900B reportedly provides a data location shift capability that permits users to transfer blocks of buffer-stored bits to any location within the Prom being programmed.

The product costs $2,100, available from the firm at 2411 Garden Road, Monterey, Calif. 93940.

Left Up in Air by Ailing Vendor, User Gets Help to Finish System

(Continued from Page 49)

sions.

The result — a turnkey minicomputer system that stores more than 250,000 pieces of instantly accessible information concerning more than 5,000 area store locations.

Some of the roughly 70 parameters contained in the system's retail store data bank include rent, traffic count; ceiling height, store depth, window height, front footage, transportation availability, corner or noncorner loacation and a summary of nearby competitors.

With this compendium of vital demographics, Garrick-Aug claims to have attracted as clients some of the country's most sophisticated retailers and restauranteurs and to have become the country's largest real estate firm dealing in store leasing.

Crucial Elements

"In retailing, location and its price are crucial elements," Garrick-Aug board chairman Michael Hirschfeld said. "We've seen retailers pay too much for a location which inhibits their necessary advertising and promotion budget. As a result, their sales volume and profits suffer."

A nonretail corporation can easily withstand a poor choice of office location because floor space costs represent only a small fraction of its total overhead. "But for a retailer, location can be everything," Hirschfeld explained.

Although many Garrick-Aug employees had retail experience before entering the real estate field and can counsel clients on merchandising and store layout, the company duplicated most of its store listings with Xerox Corp. copiers until a short time ago.

In November 1976, when the cost of using the Xerox equipment approached $2,000/mo, Hirschfeld began toying with the idea of installing an in-house minicomputer system.

After consulting a local minicomputer vendor, Garrick-Aug spent more than seven months outlining its systems requirements.

System Capabilities

Built around a Microdata Corp. Reality mini, the resulting system consists of a 10M-byte disk unit, a tape drive unit, four CRT terminals with keyboards and an impact printer. In addition, the system incorporated two portable computer access units with telephone couplers which executives can use in the field.

A built-in security code prevents unauthorized access to the Reality mainframe, and only two of the company executives have authority to override the code.

Ninety days after its installation, the system became fully operational, and after an additional 90 days, every executive in the Garrick-Aug organization was using the equipment, Hirschfeld reported.

For the first 45 days after accepting the system, Garrick-Aug maintained a parallel backup system that operated manually. But when the company exprienced no problems with its minicomputer installation, it dropped the parallel system.

Gets Results

"Within one month, our photocopying costs dropped to $250/mo." Hirschfeld recalled. "Based on this savings alone, the turnkey system will pay for itself within 10 years."

Complete Store Listings

Moreover, the system can generate complete store listings in eight hours and thus reportedly gives the company a competitive edge. If Garrick-Aug closes one lease per year because of its head start in producing store listings, the resulting commission would pay for the system's lease for that year, Hirschfeld speculated.

The board chairman also credited the computer system with accelerating Garrick-Aug's growth (10% to 12%) per year.

Small System From DeLair Called Similar to System/34

PHOENIX, Ariz. — A small business system from DeLair Data Systems, Inc. reportedly provides capabilities comparable to those of the IBM System/34 for about $650/mo under a five-year lease.

Compatible with the company's Model 1600 systems series, the 1602 primarily serves "smaller" businesses like manufacturers, distributors, retailers and accounting firms, according to a DeLair spokesman.

A basic 1602 configuration incorporates a 16-bit minicomputer with a 64K-byte central memory, 9.6M-byte removable cartrdige disk unit, 160-char./sec printer and CRT terminal with page mode and editing capabilities. As a user's business grows, the system can expand to accommodate an additional data entry terminal and increased disk capacity, the source explained.

A library of accounting software including packages for general ledger, accounts payable, accounts receivable, payroll, invoicing and inventory control reportedly allows the system to perform the financial functions needed by most businesses.

In addition to hardware and software, the $29,000 purchase price for a basic 1602 configuration covers training, conversion assistance, follow-up consultation and hardware maintenance. DeLair is located at 2639 N. 33rd Ave., Phoenix, Ariz. 85021.

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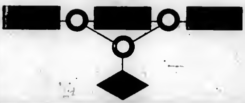

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Also Cuts Classroom Costs

System Teaches Students to Type 50% Faster

SAN DIEGO — Students at a local DP school have learned to type 50% faster than with conventional teaching methods since the institution supplemented its typing instruction with a mini-computer based educational tool.

Capable of concurrently monitoring the activities of up to 64 typing students, the Coleman College system forms part of an automated typing instruction program called Comtutor, which college president Coleman Furr and his wife Lois developed several years ago to supply application packages for computer-aided instruction.

In addition to speeding instruction for beginning typing students, the system has cut classroom costs from $12 per seat per day to about 20 cents per seat per day, Furr said. The system's users include not only novice typists but also programmers and computer operators interested in learning how to use keyboard terminals.

"The system is ideal for school instruction," Furr explained. "It can be turned on in September and turned off in June, and that should accommodate the majority of high schools that teach typing."

Built around a 32K-byte Computer Automation, Inc. Naked Mini, the system incorporates a 5M-word disk unit and a battery of 1,920-char. CRT terminals. Software support includes two proprietary packages that facilitate machine interfacing and student instruction.

Coleman College's software faculty spent more than a year developing the system's interface program, which is based on Computer Automation's Real-Time Executive and which allows the processor and CRT terminals to communicate in real time.

User Capacity

Recalling the main criteria that led to the selection of the school's current configuration, Furr explained, "We needed a system initially that could handle 30 students simultaneously at 30 terminals. If all of them hit the "enter" key at the same time, we wanted the computer to make all the entries immediately."

As it stands now, the system with its software driver can accommodate up to 100 terminals, "but that's probably the outer edge," Furr said.

In operation, the Comtutor system "monitors each student's progress in accuracy and speed during a period covering 30 exercises," according to Bill Wadsworth, administrator of both the school's typing curriculum and its television studio, which produces video tapes to aid instruction in programming, secretarial and stenographic courses.

"The student progresses independently at his own speed. For instance, if he is ill and has to miss a day, the system will resume the lesson when he returns and keys in at precisely the point he left off."

The system registers the student's typing as it occurs and notes the number of errors and the number of words typed per minute. It then displays this information on a CRT terminal to guide the student through the next exercise.

Testing Procedure

Students may not proceed to the next lesson until they have passed a test for the current one.

Testing evaluates each student's speed and accuracy in an attempt to correct individual weaknesses. Because the system grades student performances, it increases the amount of time Coleman College's instructors can devote to individual students.

Another system feature that permits teachers to spend more time teaching is a computer-stored and -updated record of each student's classroom performance. With the system, instructors can access these records on demand.

The computer also proofreads, performs calculations and keeps records of statistics like the number of times each exercise is typed as well as completion times, errors and speed.

When students complete the 30th lesson and pass the associated test, they have achieved a minimum speed of 30 word/min for three minutes with no more than four errors. The test covers all the numbers and letters of the alphabet in a textual format. At this point, students must make the transition from terminals to typewriters.

Coleman College allots three classes for the transition, and Wadsworth claims most students make the changeover easily in preparation for placement in professional positions.

Comtutor's applications are not limited to instruction, however. During nonclass hours, it also performs various administrative functions.

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What to do for a DBMS headache.

A look at data base management systems in our October 30th Special Report.

Getting the right information to the right people at the right time can create tough problems in any large DP system. And the increased bulk of associated information that DP systems handle means a need for more efficiency, capability, and responsiveness.

Data base management systems — the heralded, but controversial solution to increased systems complexity — is the subject of our October 30th *Computerworld* Special Report. Edited by Don Leavitt, *Data Base Management Systems* will be examining many of the uncertainties about DBMS which make it difficult for the planner to determine whether it suits his needs. We'll have stories from users themselves, telling you how they have utilized DBMS, as well as words to the wise on DBMS "overkill". We'll have tips, pointers, and in-depth reviews on evaluating, selecting, applying, and trouble-shooting DBMS, including topics like:

- *The impact of new DBMS on an organization: who "owns" the data? Who's responsible for its accuracy? Who can use it?*
- *Using DBMS on minicomputers [and even micros].*
- *Relational systems: How they're doing in the real world.*
- *The future of DBMS.*

If you currently use DBMS software, or are planning to buy, this Special Report will be of special interest to you. And if you market DBMS, you'll reach a wide end-user audience here. Ad closing date is October 13th, and your *Computerworld* representative can give you full ad planning assistance. Or, to reserve space for your ad, call Terry Williams at 965-5800.

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AMPEX

Mini, Mainframe Spurned

User Thinks Small, Brews Big Savings

Special to CW

HOUSTON — A microcomputer rather than a mainframe or minicomputer is helping Coors Northeast, a Houston wholesale beer distributor, compile sales reports that have helped the firm boost its sales.

The company, which distributes half a million cases of brew a year to taverns and stores in its territory, once had to wait two weeks for monthly sales reports that compared results on different types of accounts, ethnic areas and demographic sectors, together with comparisons with results of the previous month and of the same month last year.

Salespeople then could spot sales downturns and other developments, but it often was too late to do anything about them.

A year ago, Coors Northeast bought a microcomputer system and developed its own software for route accounting. Now the monthly sales statistics are "whipped out" in four hours, and Coors Northeast can dispatch salespeople "where they're needed," Vincent Polichino, operations manager, said.

"We're able to see results from targeted work in the field, see what's happening out there right away and send in people right away," he added. "This has helped us boost sales by 6%."

In addition, the system handles daily route accounting, reconciling sales and inventory, checking each driver's settlement sheet (what he took out vs. what he returned) and computing cash from sales.

Vincent Polichino, operations manager, takes a turn at Coors Northeast's micro system.

User Selling System

The system has worked so well that Coors Northeast now is offering to sell it to other Coors distributors, with Burcon, Inc., the Houston Mits/Altair distributor, supplying hardware and the beer wholesaler supplying software.

While the system so far has been used as a sales tool, Coors Northeast also has purchased a general ledger software package developed by Altair Software Development Co. (ASDC) and soon will buy a payroll package from ASDC. Adding those two functions is expected to create labor savings.

Coors Northeast's hardware is comprised of a Mits/Altair 8800B CPU with 48K of core memory, three floppy disk drives, a Lear Siegler, Inc. ADM-3 CRT terminal and a Texas Instruments, Inc. Model 810 high-speed printer.

The system was acquired from Burcon, one of 40 distributors of Mits/Altair microcomputer products manufactured and marketed by Pertec Computer Corp.'s Microsystems Division.

The desktop hardware cost about $12,500, and Polichino wrote the route accounting software package himself for about $8,000. A minicomputer system for the same task

(Continued on Page 58)

Imsai Adds Desktop System

SAN LEANDRO, Calif. — Imsai Manufacturing Corp. has introduced the Series PCS-4X personal computer system, an integrated system that features an 8085 microprocessor, 32K/64K bytes of random-access memory (RAM), dual 5.25-in. floppy disks and serial and parallel I/O in a desktop cabinet.

Available in three versions, the PCS-40, PCS-42 and PCS-44, the series provides disk storage capacities of 180K, 400K and 780K bytes, respectively.

For a complete system, the user need only add a terminal; alternately, the system can be completed by adding a keyboard, video interface board and video monitor, Imsai said.

The system can be expanded with the addition of interface boards, RAM and disk drives.

The PCS-40, PCS-42 and PCS-44 cost $2,695, $2,995 and $3,695, respectively, from Imsai at 14860 Wicks Blvd., San Leandro, Calif. 94577.

Terminal System Self-Contained

HOUSTON — CMC Marketing Corp. has unveiled the TEI PT208, another model in its Processor Terminal series.

The TEI PT208 is a self-contained terminal system with display, disk storage, full keyboard and an 8-slot motherboard; it can be used either as a stand-alone processor or as a processor terminal in a larger system, the firm said.

The terminal features a 9-in. high-resolution monitor, a full Ascii keyboard with eight user-designated special function keys and a 16-key numeric cluster pad; as well as two Shugart Associates, Inc. SA-400 minifloppy disk drives, a spokesman said.

The 8-slot mainframe contains an MPU board featuring an 8080 processor and a special circuit that has a start-up "jump to" routine to any user-selected byte address, he noted.

Included are 32K bytes of static random-access memory (RAM). An additional RAM can be provided as an optional item.

The PT208 also has a disk controller which handles three minidrives; its I/O board provides three parallel and three serial ports. Outputs are RS-232 and TTL.

Optional software includes the CP/M operating system, Super Basic and Fortran. The PT 208 is priced at $4,695 from CMC Marketing, Suite 515, 5601 Bintliff, Houston, Texas 77036.

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Utilities Work for TRS-80 Users

ORANGE, Calif. — Racet Computes has introduced Remodel, a software utility that allows users of the Radio Shack TRS-80 to renumber any portion or all of a Basic program, move any portion from one location to another or delete any range of lines.

Remodel will also readjust line number references where required, according to the firm.

The utility, which Racet said was designed to assist in creating well-organized, readable and easy-to-document programs, is available for 16K-, 32K- or 48K-byte units.

Another utility, Proload, extends the power of Remodel with features to load all or any portion of a basic program, combine Basic programs with renumbering and merging into any location, save combined/merged programs and verify bit-for-bit the contents of saved programs, Racet said.

A third tool, Copsys, allows users to copy system tapes generated from the Radio Shack Editor/Assembler program and can reportedly be used to duplicate those system tapes before they become damaged.

Remodel costs $24.95, Proload costs $14.95, a combination of Proload and Remodel costs $34.95 and Copsys costs $14.95 from Racet Computes, 702 Palmdale, Orange, Calif. 92665.

Debugger Built for Z80

PRINCETON, N.J. — Xitan, Inc. is offering Z Bug, a dynamic software debugging utility that the firm says provides techniques for developing Assembly language programs when used with Xitan's macro assembler.

Z Bug extends the standard debugging tools of memory, register examination and breakpoints by adding user-controlled data formatting, trap capabilities with tracing and expression evaluation of user-entered data.

Designed for use with a Z80 microprocessor under a CP/M disk operating system, Z Bug requires 13.25K bytes, including data areas. It is priced at $89 from P.O. Box 3087, 1101-H State Road, Princeton, N.J. 08540.

Vector MZ Supported

WESTLAKE VILLAGE, Calif. — Described as a disk operating system for Z80 and Micropolis Corp. disk drives, MZOS from Vector Graphic, Inc. also features compatibility with software written for the North Star Computers, Inc.

MZOS was designed to support the Vector MZ system or a similar configuration. It incorporates several features to upgrade system performance, such as implied execution, which permits a file to be executed by just typing a name, the firm said.

MZOS allows the directory to be listed in two different formats, either in two columns for viewing 32 entries at once or in six columns for "fast" format.

MZOS costs $60 from any Vector Graphic dealer or from the firm at 31364 Via Colinas, Westlake Village, Calif. 91361.

Extender Card Eases Debugging Of Intel Units

SAN DIEGO — An extender card for Intel Corp.'s Intellec and Intellec II systems is now being offered by Electronic Solutions, Inc.

The Model 80 EX-2 raises the cards located in Intel's backplane card-cage combination to probe their test points for debugging purposes, a spokesman explained.

All of the standard and auxiliary contacts are brought through from the backplane to the extended connectors.

The extender card will reportedly operate with the 8080A, 8085, Z-80 and all other microprocessors compatible with Intel's Multibus. It costs $54 from Electronic Solutions, 7969 Engineer Road, San Diego, Calif. 92111.

Beer Distributor Brews Savings

(Continued from Page 57)

would have cost between $35,000 and $50,000, he said.

Coors Northeast has 10 routes. When its truck drivers complete their travels each morning, data from each of their sales tickets is entered into the system — some 300 entries daily.

By 10 a.m., management has a complete report on the day's sales, also reconciled with inventory. Previously this report wasn't available until late afternoon.

Polichino noted that inputting data to the route-accounting system takes about the same time as with the old manual approach, but "we get data out of it 10 times faster."

The monthly sales report, which used to take two people two weeks to compile, now is available in four hours. A salesperson can easily inspect any account simply by having the CRT highlight sales "right up to today," Polichino said.

Previously, the salesperson would have to dig through old cards.

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Overseas Expansion Planned

Fiscal Control Brings 60% Growth at SI

By Marcia Blumenthal
CW Staff

ANDOVER, Mass. — Software International Corp. (SI) is located about 30 minutes away from the bustle of the Rt. 128 silicon loop surrounding Boston. Occupying the only modern building in this Colonial-styled bedroom community, SI definitely stands out.

The firm's growth has also been outstanding — with a compound annual growth rate of 60% since its founding 10 years ago.

Controlling this growth to assure financial stability has been the philosophy behind all the company's activities. SI markets two products, manufacturing and financial software packages, which it sells to a broad base of industries.

Future plans include expanding sales internationally and moving into the small business sector of the market.

SI got its start when IBM unbundled its software. William G. Watson, a founder and president of SI, had left IBM and formed a consulting firm. In his consulting work, Watson developed a general ledger system which could be used by almost anyone. After the IBM unbundling announcement, he saw a void in the market — a void for which he already had a product.

Fast Growth Risky

Donald K. Lane, executive vice-president, is also an ex-IBMer and has been with SI from its beginning. "I was a marketing rep for the insurance industry segment of IBM and it was boring; that's why I left. The opportunity to take a company from sales of $300,000 to $9 million in 10 years is a rare challenge," he said.

"We can't keep growing at 50% to 60% forever," Lane admitted, "but 25% to 30% would be good." Growing too fast is the greatest risk for SI because a company can easily outgrow its capital capability, he pointed out.

Therefore, one of SI's policies has been to hold down investing too heavily in the marketing side, Lane said. For instance, "if we sold too many packages, we would not have the technical capability to install and service those systems."

A sales staff doesn't bring in revenue right away, Lane observed, "so if you double the size of your sales staff at once, you don't get any return for a long time."

Eight years ago the company had one salesman; in 1976 the sales force numbered 10, then increased to 15 in 1977. It totals 22 this year.

Growth has come primarily from the sales and service of standard software packages, 99% of which have been developed inhouse. SI's two major products are the Financial Management and Control System and the Manufacturing Resource Planning System.

Revenue for this year is expected to top $8.5 million, up 56% from last year's revenues of $5.9 million. The company has been profitable since its first year.

Standardization Policy

Sales of standardized software packages is another policy to which SI attributed its financial stability. "Customizing is not a way of life at SI," Lane said. "This year only $72,000 has been realized from customizing, which usually runs no more than 3% of our revenues.

"Our objective is to do no customizing, and we don't give our sales force extra commissions for big customizing jobs."

As part of its controlled growth ethic, SI has avoided being enticed into interesting product development. For example, turnkey systems "where we would provide the hardware as well as the software are attractive," Lane said, "but it can easily get a company in over its head."

Instead, expansion has come from entering new markets. In the next year SI will begin offering a fuller range of products in the international sector.

The company has an extensive overseas agency system, with about 14 agents. It recently introduced its manufacturing package overseas.

A major emphasis for the next year will be marketing to small businesses. "A few years ago our major market was the Fortune 1,000 companies. Now that is changing, and we are offering our products to a wider base of small business users," Lane said.

CW Photo by M. Blumenthal

George Washington didn't sleep here. SI's modern offices are a standout in this Colonial-style suburb.

The firm has announced or is committed to

(Continued on Page 62)

Experts Contend Mainframers Must Break Design Barriers

By Marcia Blumenthal
CW Staff

NEW YORK — Mainframers, even those reaping bonanzas in the mini marketplace, are concentrating on achieving breakthroughs in the architecture of large-scale systems which will both reduce the costs and enhance the functionality — ease of use — of these systems.

However, versatility will also be a key to success in the computer market of the 1980s. Mainframers will have to develop not only large-scale systems, but also minis, terminals and software.

While processing speed is still an important consideration in designing large-scale systems, mainframe makers will have to increase functionality, reliability and security, as well as decrease the time needed to develop applications software, according to experts making presentations and predictions at a two-day technology seminar sponsored here by Martin Simpson Research Associates, Inc.

Richard H. Hill, director of systems and product planning for Honeywell, Inc., described two possible future hardware scenarios. Either users will spend less for hardware, investing instead in data networking and software, or expenditures for hardware will remain stable at about 40% of the DP user's budget, with the hardware mix changing.

Honeywell, Hill said, does not see a slackening in hardware expenditures as a percentage of total DP outlays, but he noted that distributed processing is helping fuel tremendous growth in the mini sector.

Users can now afford to waste processing time, Hill contended, because processing costs are dropping 20% a year and memory costs and data storage costs are declining 30% and 40% a year, respectively, with no

(Continued on Page 60)

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Experts Say Design Barriers Must Be Broken

(Continued from Page 59)

slowdown in that price descent in sight.

"A business can afford to use a computer for four hours to 10 hours per week and have special computers for special applications," Hill maintained. With memory size becoming smaller, "you can literally afford to waste memory rather than make a program more efficient."

Changing Role

Despite user acceptance of minis for distributed processing, Hill does not see mainframes going the way of dinosaurs in the future, but suggested large-scale systems will play a changing role in the DP environment of the '80s.

In the future, large mainframes will provide flexibility to support batch, transaction and time-sharing operations within a distributed environment. The large-scale unit, according to Hill, will become a processing utility, totally invisible to the end user. Data base management will be a major function for high-volume, high-speed processors.

However, despite the investment in large-scale system design, the market for mainframes appears to be shrinking. Hill estimated the growth at about 15% for the foreseeable future, but Robert T. Fertig, vice-president of Advanced Computer Techniques Corp. (ACT) and head of ACT's Technology Analysis Group, pegged the growth in the mainframe market at 10% to 11% annually in the coming decade. Fertig suggested that the current 12% to 15% growth for mainframes is a temporary surge resulting from the high demand for IBM's 30 series.

However, Neil Gorchow, Univac's vice-president of product strategy and requirements, emphasized that the central site accounts for the greatest dollar amount spent by users aside from software.

Fertig disagreed with Hill's assessment that hardware as a percentage of DP expeditures will remain stable. Relating his comments primarily to projections of IBM's strategies for the 1980s, he said that unless there is a major change in architecture, users will spend more on software-related items. The costs of new applications software with maintenance and service, Fertig said, will surpass the cost of hardware as a percentage of user costs over the next five years.

IBM's Future

"If IBM continues with the same organizational structure and products, it will have a $5 billion revenue gap by 1981," Fertig forecast, explaining that this gap was calculated using IBM's own projected annual corporate growth rate of 14%.

To avoid that gap, IBM will make a competitive foray into the U.S. services industry, including field engineering, systems engineering and program products, Fertig said, noting that this area of IBM's business is the fastest growing sector within the company, increasing 27.1% between 1976 and 1977.

With IBM's R&D investment at $1.3 billion and growing rapidly, Fertig said IBM will be investing heavily in office automation, communications and software.

In spite of the diversification into other product areas, IBM is not neglecting large system development, he noted. The firm's mainframe architecture, even for the 30 series, is 13 years to 14 years old. That architecture has problems with data rates and security and its reliabilty is "insufficient for the trend in on-line systems for the future," he added.

During the 1980s, IBM will address the problems of bus structure, data repository and directory and hierarchical storage, Fertig said.

The "H" series, to be introduced in the early '80s, will, according to Fertig, be based on "off-the-shelf" technology. The much-heralded series, which will permit upgrades from the 30 series, will incorporate distributed functions within a bus-oriented design, using very large-scale integration (VLSI) and will use chemical coolants for cooling chips and boards.

Fertig, as well as Gorchow, did not foresee any great technological leaps in the next five to seven years, when Josephson's Junction technology may become feasible.

Gorchow maintained that a prime motivation for technological research should be cost reduction. Univac, he said, has invested heavily in VLSI for the future.

Aside from developments in hardware, Gorchow stressed the need for a breakthrough in applications software. Programmer productivity has not kept pace with gains in hardware design. Programmers still produce only about 10 lines of code per day, he complained.

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EDP professionals have a word for the new Wang VS computer.

"Incredible."

Richard Berger, Vice President and Data Processing Manager, Bughaus, Inc., a Volkswagen service center network headquartered in Hartford, Conn.

"Because we had been using a computer—the Burroughs B1700—with card input sequential files and no video displays, we suffered long delays and storage constraints.

"Now, with our Wang VS system, storage is virtually unlimited, and we simply recall a screen load of information on the CRT to make a change in seconds—all of this without interrupting our normal flow of work.

"We've put everything in our business onto our VS system, including payroll, accounting, sales and wholesale and retail inventory control. And we did it in 90 days without changing languages and with only minor modifications in almost 90 COBOL programs."

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One more thing: the entry level price of the VS is under $50,000. Which is perhaps the most remarkable thing of all about this computer.

For more information on the VS, return this coupon to Wang Laboratories, Lowell, MA 01851.

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But Key-to-Storage in Decline

Data Entry Segments Seen Growing 16%/Year

SAN JOSE, Calif. — Some segments of the data entry equipment market will grow at an annual rate of 16.2% during the next four years, increasing its U.S. revenues from approximately $1.1 million in 1977 to $2.3 million by 1982.

Optical character reader (OCR) equipment, general-purpose terminals and special-purpose data entry equipment, in particular, will show robust growth, Creative Strategies, Inc. (CSI) reported in a recently published industry study. Increased foreign marketing will contribute to the industry's growth, the report concluded.

However, the traditional data entry equipment segment, defined by CSI as key-to-storage equipment, will decline annually at about 3.4%, with revenues dropping from $560 million in 1977 to $470 million by 1982.

The giant share of future revenues will be funneled to what CSI termed the nontraditional data entry equipment segment. Portable data entry devices, now the smallest factor in the marketplace, are the fastest growing sector.

These portables are expected to generate $166 million in revenue by 1982, posting a vigorous annual growth rate of 29%, CSI forecast.

Otherwise, OCR equipment, spurred by increased demand for low-priced page readers and hand-held wands, will grow at the more sedate annual rate of 16.2%, which is the rate predicted for the nontraditional segment of the data entry equipment market.

Demand for CRT terminals will, according to CSI, push certain OCR companies to the forefront of the marketplace. The trend toward distributed DP, particularly in that part of the industry which is terminal-oriented, will in turn influence the demand for OCR equipment.

Aside from terminals, the need for factory input equipment, now a relatively small force in the marketplace, will grow at a compound rate of 17.5% during the next four years, creating further demand for OCR equipment.

Foreign markets are also seen as expansive outlets for data entry equipment. Not only are foreign markets growing but, CSI noted, the revenues from foreign buyers tend to be higher because they are derived from equipment sales rather than from rentals.

New Concepts

While the market for data entry equipment is expected to continue on the upswing, companies in this industry, particularly OCR vendors, are under continual pressure to develop product concepts that will allow their devices to be used for more than one or two applications, CSI pointed out.

Both hardware and software are involved in the design challenge, CSI said, with modular design seemingly the major need in the marketplace.

Developing systems — rather than individual devices — that can be incorporated into various data communications networks — now being implemented by mainframers is an important technology consideration for data entry equipment makers, CSI concluded.

Because the range of approaches to data entry products is diverse, competition is not currently concentrated. But several mergers have taken place recently, leading CSI to predict that in the future only a few companies will supply the bulk of the data entry equipment.

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"...we converted to the Fortex fixed asset system in 12 days... and met our standard closing schedule with no lost time!"

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With every software package, we offer expert technical support personnel, who have program experience *and* functional know-how. They are expert in not only system capability, but in documentation as well. Miss Johnson termed the PIMS systems documentation "...very complete".

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We believe a system should give you the information you want, in the form you find most useful, at the time you need it. And that's why we designed our systems with true modularity and maintainability. We can tailor them to your functional requirements.

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SI Attributes 60% Growth To Careful Fiscal Control

(Continued from Page 59)

products to run on the IBM System/34, the Honeywell, Inc H62 and the Hewlett-Packard Co. 3000.

Anticipating significant growth in the small business sector, Lane said SI will probably start forming smaller sales territories and hire less technically oriented salespeople who can talk to controllers and managers instead of managers of DP centers in large firms.

Taking products to industry-specific markets is another goal for the next fiscal year.

Modifying products is an ongoing task at SI; R&D expenses are 25% of revenues, Lane said Next year the firm expects major additions to its financial package, which is now in its fourth version.

SI is also moving to putting systems on-line," Lane added.

Acute personnel shortages are now evident in some areas, Lane acknowledged, noting that personnel experienced in data base management and on-line systems are scarce.

The firm, however, does not anticipate significant diversification and will remain specialized. Executives of the company suggested, however, that the continuing growth of the company, which claims it is the second largest U.S. software firm, may require public equity financing within the next three years.

CW Photo by M Blumenthal

Don Lane

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BILLINGS

Contracts

National Semiconductor Corp. will provide up to $14 million worth of its Datachecker electronic supermarket systems to Acme Markets, Inc. of Philadelphia and Alpha Beta Co. of La Habra, Calif., over the next three years.

The Pertec Division of Pertec Computer Corp. has been awarded a $1.3 million renewal contract by Jacquard Systems of Santa Monica, Calif. Pertec FD510 floppy disk drives will be used in the Jacquard J100 minicomputer system.

Martin Marietta Data Systems has been awarded a contract to provide a minicomputer-based manufacturing software systems for Exxon Enterprises, Inc.

Kennedy Co. has received a $250,000 contract for its 9700 tape drives from Rolm Corp. for use in Rolm's computer-controlled automatic branch telephone exchange systems.

Interactive Sciences Corp. (ISC) has been awarded a three-year, $750,000 contract by the Dept. of Energy, Brookhaven National Laboratory. ISC will provide the Chemical Information System to government and private industry in North America and Western Europe.

Computel Systems Ltd. has received a contract for facilities management and systems development from the Saudi Arabian Ministry of Planning. Under the terms of the three-year contract, Computel will manage a data center with an IBM 370/145 in Riyadh, the capital city.

Recognition Products, Inc. has received a purchase contract worth more than $2 million from J.C. Penney Co., Inc. to supply optical character recognition (OCR) and readers for attachment to electronic point-of-sale cash registers in Penney stores.

Digital Equipment Corp. has signed a contract for delivery of eight dual TMS-8 text management systems with Gannett Corp. of Rochester, N.Y.

DBA Systems, Inc. has been awarded a $450,000 contract from Elgin Air Force Base to deliver a Graphic Attitude Determining System.

The Pertec Division of Pertec Computer Corp. has been awarded a contract of more than $200,000 from Sord Sunstone Computer Corp. of Independence, Mo., for Pertec's FD200 floppy disk drives, which will be used in the Sord Model 222 small business system.

Texas Instruments, Inc. has received an order from United Airlines for 1,900 Omni 800 Model 810 printers. The printers will replace 500 page writers and 1,400 ticket printers used in United's Apollo reservations system.

Dymac Division of Spectral Dynamics has received a $454,000 contract from Atlantic Richfield Co. for a computer-controlled machinery monitoring system to be installed at the Prudhoe Bay oil field on Alaska's North Slope.

Codex Corp. has been awarded a national noncommitment contract with AT&T's Bell System Purchased Products Divsion for the Codex 8200 local distribution service unit.

Computer Devices, Inc. has been awarded a $200,000 contract to provide Miniterm 1202 terminals to Steak and Ale Corp. of Dallas, Texas. The terminals will be used with a microcomputer-based cash register as a hard-copy I/O device to provide a mix, cost information, labor utilizaiton and other managment reports.

American Microsystems, Inc. has signed a $10 million two-year contract with Northern Telecom, Inc. for custom MOS large-scale integrated circuits.

Pertec Computer Corp.'s Service Division has signed a two-year contract to provide field maintenance to Key Tronic Corp.'s line of optical character recognitoin.

Honeywell Information Systems Ltd. has been awarded a $2 million contract by the Metropolitan Council of the City of Bradford, England, for a dual Series 60 Level 66 to handle applications covering financial services.

Texas Instruments Supply Co. has signed an agreement to purchase Applied Digital Data Systems, Inc.'s Regent 100 and 200 CRT terminals.

Informatics, Inc. has been awarded a subcontract by the American Geological Institute for the purpose of jointly undertaking a networking study funded by the National Science Foundation.

Computer Sciences Corp. has been selected to negotiate a contract with the National Aeronautics and Space Administration to provide computer systems engineering and DP support services to the Johnson Space Center at Houston, Texas. The total value of the five-year contract will have an approximate value of $70 million.

Rockwell International Corp. has received a $5.7 million Air Force contract for maintenance gear for satellite communications systems.

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DEC Year Revenues Up 36% As Earnings Show 31% Rise

MAYNARD, Mass. — Digital Equipment Corp.'s 1978 revenues rose 36% and earnings jumped 31% over last year's totals.

DEC President Kenneth H. Olsen attributed the company's performance partly to an "aggressive build-up" of DEC's selling and service capabilities.

"We have been particularly encouraged by the excitement in the marketplace caused by our 32-bit VAX-11/780 computer and, more recently, the 36-bit Decsystem-2020 computer. We also made important enhancements to our Decnet capabilities which further strenghten our position in the distributed data processing market," Olsen said.

Cautious About Future

While DEC is planning for growth for fiscal 1978, Olsen said the company is moving ahead cautiously, partly because of uncertainties in the U.S. economy.

Revenues for the year totaled $1.4 billion compared with $1.058 billion last year. Fourth-quarter revenues were $412.5 million, up 25% from the $330.3 million reported in 1977's last quarter.

Earnings for the year netted $142.1 million or $3.40 a share compared with last year's $108.5 million or $2.78 a share. Fourth-quarter earnings totaled $46.3 million of $1.08 a share, up from $41.1 million or $1.05 a share in the year-ago quarter.

Financial News

CCI Six Months See Earnings Gain, Revenues Lose

ROCHESTER, N.Y. — Despite a dip in revenues for the first six months of 1978, Computer Consoles, Inc. (CCI) showed an increase in per-share earnings.

Revenues slipped to $7.1 million for the first half compared with last year's six month revenues of $8 million. Earnings increased, however, totaling $359,662 or 19 cents a share compared with $288,036 or 17 cents a share in the comparable 1977 period.

Major Directory Assistance System equipment acceptances were made during the first six months, with nine systems installed, CCI reported.

A Facilities and Equipment System and a Direct Access Intercept System were installed during the second quarter. However, the performance for the second half of 1978 is subject to timely acceptance of several large systems, the company noted.

Contract negotiations continued on the International Service Position System, CCI said, with four systems now planned for installation by mid-1979. Several other systems and enhancements are planned, according to the firm.

As of June 30, the firm had a backlog of 40 million and employed 405 people.

NCS Net Rises, Revenues Steady For Quarter

EDINA, Minn. — National Computer Systems, Inc. (NC) reported a 17% increasing in earnings for its second quarter. Revenues for the 1977 and 1978 second quarters, however, were about the same, totaling just over $7.4 million.

Net income for the quarter was $755,300 or 46 cents a share, compound with $647,100 or 40 cents a share in the corresponding quarter a year ago.

Six-Month Performance

Six-month revenues topped $13.8 million, up 21% from the $11.4 million reported in the year-ago period.

Earnings for the six months reached $1.2 million or 76 cents a share, a 22% increase from 1977 six-month earnings of slightly more than $1 million or 63 cents a share.

"Recent activities have been highlighted by our successful public stock offering. Also, orders for our Sentry scanning systems are running well ahead of plan," according to Charles W. Oswald, chairman and chief executive officer.

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Computer Business News

Foreign Orders & Installations

Two Japanese banks, the Takasaki Credit Bank and the Shokusan Mutual Bank, have ordered Univac 90/60 and 90/80-3 systems, respectively, valued at about $4.4 million from Nippon Univac Kaisha, Ltd.

The UK's Northern Engineering Industries has ordered seven Honeywell, Inc. Level 62 systems.

Systemplanning of Amsterdam, The Netherlands, has acquired the first IBM Series/1-based software package that DDP Products, Inc. has sold outside the U.S.

The Direct Revenue Administration of the Belgian Ministry of Finance has installed two NCR Corp. V-8570 Criterion systems for processing income taxes, real estate taxes, company taxes, automobile taxes and expenses.

Sabena Belgian World Airlines has ordered a Univac 1100/2 system and UTS 400 intelligent terminals valued at approximately $3 million. The equipment will be installed at Sabena's headquarters in Brussels and will be used for handling the airlines air cargo and message-switching applications.

The Swedish government has ordered 22 Honeywell Inc. series 60 Level 64 systems from CII-Honeywell Bull for installation in regional tax collection centers. In addition to handling tax collection and county financial and accounting tasks, the systems will be used for urban and planning administrative and statistical work.

Delta Systems, Inc.'s European distributor, ADS International in Germany, has ordered $4.6 million of Delta's products for the supermarket industry, general retail market and bars and restaurants. The company has also received a $750,000 order from the Australian market.

The Federation du Credit Mutuel de la Charente, based in Angouleme, France, has ordered an NCR Corp. V-8550 which will use NCR's Virtual Resource Executive operating system and two interactive systems, an I-8200 and an I-8250.

A Spanish automobile body manufacturer, Finanzauto S.A. of Madrid, has ordered a Univac 90/70 system valued at approximately $1.2 million.

Two Malaysian banks have ordered NCR Corp. systems. The development and Commercial Bank will install an on-line system based on an interactive I-8250 and NCR 2500 teller terminals. Public bank will install an I-8230 system that will be used initially for account processing.

Processamento De Dados Amasonas S/A, a Brazilian DP services firm, has ordered a Honeywell Inc., dual Series 60 Level 66 system from Honeywell Bull do Brasil S/A.

J.H. Rayner Ltd., a London-based commodities firm, has installed an NCR Corp. 8450 system to provide access to information on the commodities in which the firm deals.

Tokyo Sanyo Electric Co., a Japanese manufacter of refrigeration equipment, acoustic instruments and semiconductors, has installed a $2.6 million Univac 1100/11 system in its headquarters in Gumma Prefecture. The system was supplied by Nippon Univac Kaisha, Ltd.

Amsterdam Sonesta Hotel has installed a Philips Integrated Hotel System 2000. among the applications the system will handle are room management, guest accounting, telephone switchboard, marketing reporting and security.

Saibu Gas Co., a Japanese utility, has ordered a Univac 90/80-3 system valued at approximatley $1.9 million. The system will function as a duplex system with an already installed Univac 9700.

JDC Data A/S, a Danish service bureau, has ordered two NCR Corp. V-850 computers valued in excess of $2 million to expand the firm's on-line DP services.

New Companies

Katcard Systems International, Inc. has established an American subsidiary at P.O. Box 6900, Ogdensburg, N.Y. 13669. The firm will be responsible for marketing the KSL System 340 minicomputer and Manupacs, the manufacturing planning and control system that is run on the mini.

Info 3, publishers of DP training courses, has created a **Data Products Division** for marketing magnetic media and other system-related supplies. Its offices are located at Suite 193, 21241 Ventura Blvd., Woodland Hills, Calif. 91364.

Vista Computer, Inc. has been established to provide custom-designed business computer systems. Its offices are located at 2 Corporate Park Drive, White Plains, N.Y. 10604.

Canoga Data Systems has been formed as a division of Perkins Research and Manufacturing. Based in Canoga Park, Calif., the company will produce fiber optics-based systems for the DP and telecommunications industries.

Computer Consulting Corp. has been formed to provide programming, consulting and software support. The firm is located at 4502 MacCorkle Ave. S.E., Charleston, W. Va. 25304.

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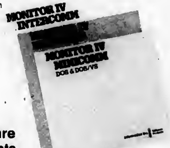

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From our Bedminster, NJ headquarters, located on a beautifully landscaped 422-acre tract, AT&T Long Lines manages the network of long distance facilities that join together the telephone companies—both Bell and independent—throughout the nation. We also provide and maintain overseas cables that link U.S. telephones with the rest of the world.

Using large-capacity microwave radio relay systems, underground coaxial cables, and communications satellites, AT&T Long Lines telecommunications networks handle more than 35 million long distance calls a day, and transmit many other kinds of communications such as radio and TV programs, news stories and wire photos, and data services for business and government.

To keep pace with and anticipate the continually growing demand for our services, as well as to develop new and innovative applications for telecommunications, we are seeking professionals interested in the unparalleled opportunities we offer.

AT&T Long Lines has seven operating headquarters and 650 locations in 47 states. Aside from the obvious advantage of being a member of the largest corporation in the world, you will benefit in numerous other ways. For one thing, you will be working in a state-of-the-art environment, and utilizing the most advanced computers, software, circuitry and engineering/marketing concepts. You will be working closely with some of the most respected engineers, scientists, computer specialists, and marketing professionals in the country. These will include people not only at AT&T Long Lines, but also at Bell Telephone Laboratories—our R&D Unit—and Western Electric Company—our Manufacturing Unit.

Underlying it all is the pride, security, challenge, and exceptional professional career-growth opportunities that come with being a part of AT&T Long Lines.

At AT&T Long Lines, you will enjoy outstanding opportunities for professional career development, along with good salary and a benefits program that provides full protection and equity for you and your family. For prompt consideration, candidates should send resume and salary history in confidence (specifying departments of interest) to: AT&T Long Lines, Professional Employment Director, Room 5A110C, Bedminster, NJ 07921.

MARKETING OPERATIONS SUPPORT

Appropriate educational background will include an advanced degree (M.S, Ph.D.) in Operations Research, Statistics, Economics, Electrical Engineering, or equivalent work experience. Several years industry experience is desirable.

Algorithm Development

Responsible for the design and development of mathematical models and computational algorithms for various telecommunications marketing problems. Will also serve as internal consultant on matters pertaining to mathematical modeling and the development and programming of efficient computational algorithms. Preferred background would include a Ph.D. degree or equivalent work experience, and a strong background in network algorithms, simulation, systems design, and computer programming.

Competitive Analysis

Responsible for the technical support for the company's competitive analysis function, including the development of quantitative models, research methodologies and data bases for analyzing and predicting competitive behavior and planning Bell competitive strategies. The background should include an advanced technical degree or equivalent work experience. Must be capable of interfacing with clients and managing products with a minimum of supervision.

Marketing Planning

Responsible for the technical support for the company's marketing planning function, including the development of a planning data base, resource allocation models and quantitative models in methodologies to improve the planning and tracking process. A preferred background will include an advanced technical degree or equivalent work experience in corporate planning. Must be capable of interfacing with clients and managing products with a minimum of supervision.

Non-Uniform Pricing

Responsible for the development of marketing data for a non-uniform pricing project (i.e., data for price/demand elasticity curves). Will also be responsible for applications of the Business Voice Market Planning System (i.e., evaluation of the economic feasibility of new generation satellite systems). The preferred background will include an advanced technical degree or equivalent work experience in statistics and market research.

Data Management

Responsible for for the collection of customer data for the Business Voice Market Planning System, the development and maintenance of a data base system to store the data collected. A preferred background would include an advanced technical degree, or equivalent work experience, including some marketing background and a familiarity with voice products

APPLICANTS FOR THE PRECEDING POSITIONS SHOULD REPLY TO DEPT 101

MARKETING— FORECASTING & REGULATORY SUPPORT

Appropriate educational background will include an advanced degree in Statistics, Operations Research, Computer Science, or equivalent work experience.

Research Analysis

Responsibilities will include performing economic and statistical research and/or analysis required to develop and apply a variety of forecasting techniques tailored to the special conditions of forecasting interstate messages, revenues, etc. This requires a technical knowledge of econometrics, statistics, operations research, or computer science.

Systems Development

Responsibilities will include developing, implementing, and operating two manual and computerized systems. One is a complete revenue forecasting system; the other a system that will compare and reconcile outputs of existing forecast systems for construction and planning purposes. This position requires a technical knowledge of computer science and forecasting techniques.

Systems Design

This position will assist in the design and implementation of a computerized forecasting system. It requires a technical knowledge of operations research or computer science and two to three years experience in data systems design in industry.

APPLICANTS FOR THE PRECEDING POSITIONS SHOULD REPLY TO DEPT. 102

BUSINESS RESEARCH DEMAND ANALYSIS

Econometrics (Statistical Research Analysis, Trend Analysis, Forecasting & Rate Evaluation)

These positions involve applying state-of-the-art techniques in micro-demand modeling and forecasting to telecommunications needs in business research, service costs and rates and marketing departments. Skills required: graduate level training in econometrics and micro-demand theory, strong background in statistics and demand modeling, excellent written and oral communications skills. Skills desired: market simulation experience, knowledge of cross elasticity studies, knowledge of FORTRAN, PL/1 programming, business experience in demand modeling and forecasting.

APPLICANTS FOR THE PRECEDING POSITIONS SHOULD REPLY TO DEPT 103

MARKETING SALES SUPPORT

Appropriate educational background will include an M.S. in Operations Research or Computer Science, or equivalent work experience, with associated areas of study that include Optimization, Programming Systems Design, and/or Mathematics. Also desired, three to five years background in computer systems or operations research that includes some networking experience. In all of the following positions, where no existing techniques are applicable, basic research will be required to develop new techniques.

Algorithm Design

Will be responsible for the design, development, implementation, and training for specific algorithm modules within Advanced Communication System and other data network systems

Administrative & Network Design

Will be responsible for the design, development, and implementation of specific modules within an administrative and network redesign system. Will also be responsible for establishing data collection procedures between AT&T Long Lines and all associated companies.

Systems Management

Will be responsible for the direct system operation and coordination of production for two marketing systems: a Switched Services Network Information System and an Automatic Message Accounting System. This position interfaces with field users, system designers, and headquarters users to define the activity required.

Customer Profile Subsystems

Will be responsible for directing activities involved in the development of a Customer Profile Subsystem and for assisting in the development of a Mechanized Collections System.

Customer Marketing Systems

Will be responsible for direct system operation and coordination of production for two marketing systems: a Customer Usage Tracking System and a Customer Oriented Market Model. This position interfaces with field users, sytems designers, and headquarters users to define the activity required.

Data Network Design

Will be responsible for the design, development, implementation, and training for specific modules within data network design systems

APPLICANTS FOR THE PRECEDING POSITIONS SHOULD REPLY TO DEPT 104

MARKETING—PRODUCT MANAGEMENT SUPPORT

Appropriate educational background for these positions will include a Master's degree in Operations Research, Mathematics, Statistics, Computer Science, or equivalent work experience. A background in market research or statistical consultation would be helpful.

Market Research/ Statistical Analysis

Responsibilities will include planning, executing, analyzing, and interpreting marketing projects involving market research and the statistical analysis of data. Projects are self-generated or are requested by product managers for the purpose of managing products, developing new services, advertising strategies, preparing material for the FCC, or supporting market activities

Senior Quantitative Analyst

This position will be one of supervising several market research analysts. An advanced degree, preferably a Ph.D., or equivalent work experience in a technical area required, as well as two or more years experience in industry or education applying quantitative techniques, plus one to two years experience supervising a quantitative marketing team.

APPLICANTS FOR THE PRECEDING POSITIONS SHOULD REPLY TO DEPT 105

MARKETING SYSTEM SUPPORT

Appropriate educational background will include a Master's degree in Computer Science or, most important, work experience relating directly to the job, i.e., experience in a specific type of software.

Software Development

Responsibilities will include demonstration of software development under the RSX-11M or UNIX operating system of the DEC PDP minicomputer. These systems will be generalized for industry oriented use in the Long Lines National Demonstration Center. Will also act as the developer of tailored demonstration software packages where required, using Bell System terminal products and services. Additional responsibilities will include software maintenance at DEC PDP minicomputers and the resolution of implementation problems involving these packages at trade shows.

Data Base Management Systems Programming

Responsibilities will include overall administration of the use of the National Sales Center as required by Headquarters Product Management and Marketing Management groups. The position will also oversee all software and hardware requirements for the center and will direct the resolution of all problems incurred, acting in a technical consulting capacity to product and market management groups. The position requires a strong background in systems programming, specifically in the DEC PDP minicomputer.

Customer System Support

Responsibilities will include coordinating all customer support activities for all Bell Modems, Low Speed Teletypewriter Terminals, and minicomputer systems that include the DEC PDP-11, data general NOVA, and similar systems. Minicomputer experience in sofware development and support maintenance is required.

Systems Programming Software

Responsibilities include support of the field sales organization in solving customer software problems. Background should include strong experience in systems programming on IBM equipment and in various programming languages. A knowledge of several operating systems, access methods, and data base management systems is required.

Systems Programming Hardware/Software

Responsibilities will include the support of the field sales organization in the solution of customer system problems. Background should include experience in mainframes (particularly IBM), front-end processors, access methods, data base management, time-sharing, application programming, protocols, line monitoring, terminals, and networks.

APPLICANTS FOR THE PRECEDING POSITIONS SHOULD REPLY TO DEPT. 106

DATA SERVICES

Appropriate educational background will include a B.S. or M.S. degree in Computer Sciences, Mathematics, or other related technical areas. Two to five years direct programming experience is desired.

IMS Data Base Management

Responsible for the development, design, testing, and maintenance of IMS systems software and supporting activities. Background should include operating systems software design and development experience and proficiency in COBOL, ASSEMBLER, or PL/1. Experience with control language, debugging techniques, and IMS/VS on-line applications is also desirable.

IMS Data Management Support

Responsible for development, design, testing, and maintenance of IMS systems software and supporting utilities. This will involve evaluation and implementation of new versions of IMS software and maintenance of existing IMS software. Background should include software design and development experience for operating systems and proficiency in COBOL, ASSEMBLER, or PL/1, and debugging techniques.

Minicomputer Software Technical Support

Responsible for technical support of minicomputer software and systems programming that includes operating system analysis and trouble resolution. Background should include mini/micro computer programming, mini-ASM, mini-BASIC, minicomputer systems and subsystem design, and telecommunications design experience.

Enhanced Product Application

Responsible for assisting in the design, implementation, and conversion of the Enhanced Product Application project that will store and provide customer profile information. Background should include experience in structured programming and design techniques, COBOL, DB/VS S370 computer environment and JCL, standard access methods, time sharing for development, testing and debugging techniques.

SORT/JCL Support

Responsible for the project leadership and support of SORT, JCL, catalog procedure and performance packages, and all Long Lines programming activities. Background should include 2 years experience programming ASSEMBLER and COBOL, strong JCL, experience with SORTS, and programming for IBM 370/145 (and up) with OS/VS, or MVS.

Scientific/Experimental Software Modeling

Responsible for performing analysis, design, and programming on several projects of a scientific or experimental nature in support of marketing, service costs, and business research users. Projects require close interaction with user groups in implementing and revising experimental modeling techniques and operational algorithms. Background should include programming experience with FORTRAN or PL/1, JCL, debugging techniques, structured programming techniques, and time sharing.

APPLICANTS FOR THE PRECEDING POSITIONS SHOULD REPLY TO DEPT 107

SERVICE COSTS & RATES

Microeconomics

Responsible for assisting in the development of various econometric pricing models. This will involve applying mathematical techniques and economic principles to a business problem, including development of a computerized EDP economic/mathematical model of pricing, general system design, programming, compilation of the input data, execution of studies, and documentation of both the methodology and results of the study. Preferred background will include a B.S. degree in Mathematics or equivalent work experience and knowledge of general economic analysis, computer subsystems design, analytical statistics, econometric modeling, and data base design.

Mechanized Information Systems

Responsible for assisting in the detailed definition and design of new or improved mechanized information systems and the maintenance of existing ones. Will assist in designing and implementing computer subsystems for various cost studies or rate plans for interstate services. Responsibilities will also involve performing data retrieval utilizing such systems as RAMIS, GIS/VS, or MARK IV. Preferred background will include experience in system, data base, and conversion design and cost benefit analysis.

APPLICANTS FOR THE PRECEDING POSITIONS SHOULD REPLY TO DEPT 108

ENGINEERING

Human Factors

Responsible for human factors engineering of computer-based information systems. Will perform analysis, design, and implementation of materials associated with the interface between the computer and the user. Background should include a Bachelor's degree in Science, Psychology, or equivalent work experience, and knowledge of forms design, human factor analysis, and job design. A year of EDP in engineering, accounting, or personnel is desirable. Positions available in several locations.

Mechanized Information Systems

Responsible for the detailed definition and design of new or improved mechanized information systems and the maintenance of existing ones. Will also be called on to retrieve data using RAMIS, GIS/VS, or MARK IV. Background should include experience in systems and subsystems design, conversion design, and systems testing.

Motivational/Mathematical Statistical Research

Responsible for the application of scientific disciplines of social, motivational, and mathematical statistical research to the design, conduct, analysis, interpretation, and presentation of projects. Background should include an advanced degree or equivalent work experience, and one to three years of related experience that includes operations research and applied statistics. Knowledge of FORTRAN a plus.

Digital Information Micro Electronics

Responsible for work in the field of digital information transmission, including carrier, radio, and time division switched systems. Projects will involve field measurements of existing equipment and designing new equipment as needed. Background should include a Bachelor's or Master's degree in Electrical Engineering or Physics or equivalent work experience, and two to five years of relevant experience.

Minicomputer Software

Responsible for the design and development of software for a minicomputer environment. In addition, work will entail system support and current engineering. Preferred background should include 3 years experience in software design and a B.S.E.E., M.S.E.E., or a degree in other technical areas

APPLICANTS FOR THE PRECEDING POSITIONS SHOULD REPLY TO DEPT 109

AT&T Long Lines

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Design, implement, test and document real-time software for minicomputer SIGINT systems for Special Projects. Software includes telemetry processing, command and control and display operation. Software may also include interactive displays, intercomputer communications and hardware device control. PDP 11/70 and RSX11 experience highly desirable.

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Develop scientific software associated with communications and surveillance systems including requirement definition, conceptual design, detailed design, coding, checkout and documentation. Areas include telemetry data processing and analysis, command generation and control, SIGINT mission planning and evaluation, orbit determination, orbit maneuver planning and space craft simulation.

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Develop data base related to scientific real-time systems applications. Responsible for data definition and data base design for multiple applications on large and minicomputer systems.

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Perform conceptual design, hardware/software trade-off studies, requirements definition, functional design and computer systems architecture for SIGINT real-time and batch data acquisition and processing systems. Provide support and direction to individuals working on software development projects. May participate in new business proposals, contract negotiations and customer interface meetings.

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Fran C. — Systems Analyst, Michigan Wisconsin Pipe Line Co. I came with the company in general accounting and transferred to EDP in 1974 as a Programmer Trainee. I received all of my data processing training here in the company. My first major responsibility was maintenance of the payroll system which requires constant monitoring and surveillance. I like the fact that here we are given responsibility when we have proven we're ready to accept it. I'm now working on a new gas information system using all the latest techniques. I'm really getting good experience with a system that will be operating for years.

Cathie B. — Programmer Analyst, Michigan Consolidated Gas Co. I joined the company as an accounting trainee in the properties department in 1973. I have a B.A. degree with a minor in accounting which has helped me to progress within the company. In three years I was given Property Accounting supervisory responsibilities. I was then transferred to EDP as a programmer and appreciated the opportunity of receiving my computer training here. I now have responsibility for property accounting systems and benefit from my prior accounting experience. My career goal? I want to work in Systems Design.

Louise C. — Programmer Analyst, Michigan Consolidated Gas Co. I have a B.S. in Industrial Management and am now involved in information system support planning which provides data on departmental personnel requirements, budgets, staffing etc. All information is stored in data base. My responsibilities include planning, setting up the data model, monitoring and summarizing. I've always taken advantage of the company's extensive training courses and am due to [illegible] soon in Information Management Systems. My next goal — Systems Analyst.

Tim A. — Modeling Analyst, American Natural Service Co. I was referred to the company by a friend and came here in 1976 with an MBA in Systems Design. We have an interesting time sharing environment that provides for interaction between finance and engineering with high visibility to management. I am able to work as a consultant, supporting management in achieving goals and developing investment strategies. As we help analyze results of our studies and projections 5, 10, 20 years ahead we become more proficient in the total company's potential. We have a unique opportunity to participate in the overall picture and see how all the companies work together and complement each other. I like Detroit too!

Ron S. — Senior Systems Analyst, Michigan Wisconsin Pipe Line Co. Initially I served the company as a software consultant and joined them in 197[illegible]. I am presently working on a Gas Planning and Reporting System — consolidating all gas activities in one data base (one source and information pool). Presently we're in the preliminary system design phase. Involvement includes conversion of business functions to data processing systems. It's a tremendous learning opportunity — more than I expected. I have a chance to use my consulting background and train others. The company listens to my ideas, gives me latitude and doesn't put a "lid" on achievements.

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PROGRAMMER ANALYST — An associate degree in computer sciences and some systems and programming experience can lead you to rewarding work with a senior systems analyst in solving computer logic problems.

These key EDP career growth positions offer high visibility to management and place you in a sophisticated professional environment supportive to implementation of your ideas. You'll appreciate the attractive total compensation plan, including generous benefits. The next move is yours! Start by sending your resume and salary history, in complete confidence to:

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Opportunity for Total Systems Accountability

The Hartford, a leading property-casualty insurance company, seeks to fill this challenging position in its EDP Audit Division.

This consultant will ensure that systems and data processing management is designing and operating DP production systems in accordance with established policies and procedures by:

- Performing operational audits of new computer applications under Project Life Cycle approach.
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Qualifications include 2-3 years of data processing systems analysis experience coupled with 2 or more years of internal audit or financial controls experience. Working knowledge of a programming language is essential. Bachelor's degree in accounting, computer science, math, or equivalent.

If you are a highly talented financial systems analyst, this could be, your opportunity to break away from typical narrow gauge EDP projects and take on responsibility for total systems accountability.

Submit confidential resume, including salary history and requirements to: Christina B. Machnich, Personnel Department, The Hartford Insurance Group, Hartford Plaza, Hartford, Connecticut 06115.

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Positions exist for individuals with minimum 3 years experience with emphasis in one or more of the following areas: COBOL, OS, BAL, OS JCL, CMS and CICS. You will be called upon to develop, and fine tune our applications programs to keep pace with our continuing growth and expansion.

SENIOR SYSTEMS PROGRAMMER

Major job functions will require you to support communications software in a TCS/VS/CICS environment, and analyze and resolve technical problems. Your background should exhibit a detailed and complete comprehension of VS operating systems, TCAM knowledge, 3-5 years systems programming experience in an OS/VS shop, specific knowledge of CICS internals and SMP, good verbal and written communications skills, and a willingness to perform goal maintenance skills.

SYSTEMS PROGRAMMER

Responsibilities encompass planning, generating and maintaining VS related software, analyzing problems in VS areas, and assisting the TP on-line area in testing and development. Proper job performance will require a technical knowledge of VM and its support, technical project leadership, 2-4 years OS/VS systems programming and development, basic communications knowledge, and the ability to supervise less experienced personnel.

BAL PROGRAMMER

Your two or more years of OS/VS BAL programming will be called upon to maintain and assure the operating systems' PTFs, as well as make the necessary corrections. Additionally, this position will involve continual product and research development, assisting the TP on-line group with fixes and code changes for TCS, TCAM, and Securities/Commodities Order Match. This position requires OS/VS HASP technical skills, knowledge of VM, ability to evaluate software problems and associated areas, and good verbal and written communication skills.

SYSTEMS ASSURANCE TECHNICIANS

We seek individuals possessing the ability to code JCL, coupled with IBM 360/370 operating system and OS/VS experience. You will be called upon to test, and debug general program ABENDS. 2 years operations experience required.

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Data Processing

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Northwest Industries, a $2 billion multi-industry company, is a leader in top management and staff use of decision support and mathematical modeling systems. We are establishing a Corporate Management Information Services staff position with responsibility for EXPRESS and other advanced software. EXPRESS is an advanced software package with analytic, modeling and data base capabilities. It is the application software basis for our interactive systems serving 75 users in a new IBM 158-AP VM/370 in-house environment.

The position — SENIOR SOFTWARE SPECIALIST.— will require software excellence in a highly professional team oriented environment.

The successful candidate will have total responsibility for EXPRESS and will maintain effective liaison with:

- application consultants
- system software specialists
- the EXPRESS vendor, Management Decision Systems (MDS)

Prerequisites should include in-depth experience in one or mure of the following areas:

- substantive analytic package support
- systems internals (particularly VM/370)
- degree in computer science or mathematics

This position provides a high degree of challenge, reward, professional development, and offers an attractive compensation package. To explore this opportunity, please respond with a resume or letter to Laurance T. Burden, Director-Management Information Services.

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Play a lead role in the planning and architecture of a transaction processing system which will be oriented to concurrently accommodating interactive and batched financial transactions via a shared file facility. Experience in design and development in some of the following areas is required: Operating Systems, Data Base Management, Transaction Processing, Financial Applications, Distributed Processing.

SYSTEMS SOFTWARE

Design, develop, and support system software for delivery of transactions to financial applications within our network. Areas of concern include operating system support and enhancement, network security, transaction routing, network configuration management, and failure/recovery mechanisms.

COMMUNICATIONS SOFTWARE

Design and develop software to operate the set of communications processors within our expanding transaction processing network. Familiarity with communications protocols and packet-switching concepts is desired.

SOFTWARE TEST AND VALIDATION

Formulate test methods and develop test drivers and validation tools to support the implementation and subsequent evolution of our new network. A background in software and systems testing methodology for large scale systems is required.

SYSTEM PERFORMANCE ANALYSIS

Define and establish performance monitoring facilities for measuring response, resource utilization and congestion in a widely distributed transaction processing network. Models and empirical techniques will be developed for configuration planning and cost/performance analysis. Data reduction and statistical analysis programs will be developed.

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Design, develop, and support on-line applications which provide consumer-oriented financial services through delivery points at both bank and retail locations. These applications cover the full spectrum of consumer banking services. A background in operating systems, real-time systems, or related on-line applications is desired.

DATA BASE MANAGEMENT

Design and administer large distributed data bases and associated access mechanisms for use by continuous operation applications which process very large transaction volumes. A background in either development or utilization of Data Base Management Systems is required; openings exist at various levels.

All positions require extensive background in on-line real-time systems, experience with large data bases, and knowledge of communication networks. BS, MS, PhD or equivalent related experience preferred. Send résume to **Lynn Anderson, Dept. 40, or call COLLECT: (213) 879-1212.**

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DATA PROCESSING

E G & G Idaho, Inc., the prime operating contractor to the U.S. Department of Energy at the Idaho National Engineering Laboratory, (INEL) has current opportunities for senior professionals:

SCIENTIFIC SYSTEMS PLANNER

You should have at least 8-10 years' experience in CDC scientific systems and a technical degree or equivalent. The work functions will include system design, selection and procurement with performance monitoring to be done on existing and future systems. Knowledge of scientific data base systems is desirable.

BUSINESS SYSTEMS PLANNER

You should have at least 8-10 years' experience in IBM 360/370 (or equivalent system). An appropriate degree or equivalent experience is required. The work functions will include system design, selection and procurement with performance monitoring to be done on existing and future systems. Knowledge of data base management systems is desirable.

COMMUNICATIONS SYSTEMS PLANNER

You should have at least 5-10 years' experience in remote batch and interactive communications. Both large scale system and minicomputer background is desired. A technical degree or equivalent experience is required. The work functions will include system design, selection and procurement. Network performance-monitoring will be done on the existing or future networks.

SENIOR SYSTEMS PROGRAMMERS

You should have at least 5-8 years' experience in the analysis, development and maintenance of system software for the CDC CYBER 173 computer system. A technical degree or equivalent experience is required. Knowledge of software internals and proficiency in the maintenance of the CDC CYBER operating systems is required to perform functions of software development and maintenance.

You should have at least 5-8 years' experience working with CDC CYBER software, user method development, and user interface functions. A technical degree or equivalent experience is required. Work functions include developing/maintaining CYBER system user methods, system information bulletins/manuals and interfacing with users to identify, analyze and design software requirements.

COMPUTER TRAINING COORDINATOR

Responsibilities will include the development of effective training programs for computer operations personnel, including computer operators and data entry personnel. Candidate should have a degree in Computer Science/Mathematics, or equivalent experience, with at least 3-5 years' experience in operating large scale IBM and CDC computer systems. Should possess effective communication skills.

The Idaho National Engineering Laboratory has installed a CDC CYBER 76, a CYBER 173, and an IBM 360/75 in its Computer Science Laboratory. The Computer Science Laboratory has the responsibility for hardware and software configuration planning and the operation of the present system.

Idaho Falls is a medium-sized community, located close to top-flight winter sports areas (Sun Valley, Jackson Hole, Grand Targhee) and unexcelled summer recreation areas (Yellowstone, the Salmon and Snake Rivers, The Grand Tetons)

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Knauf Fiber Glass, a new name in fiber glass insulation, is seeking a degreed candidate for Manager of Procedure Development.

The individual we desire will be required to establish standard procedure formats and document corporate procedures and techniques covering a broad spectrum of business, administrative and operations functions.

Knauf Fiber Glass is interested in candidates with a manufacturing background, interested in stable employment and with 2 to 3 years experience in corporate procedure analysis and development.

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New opportunities due to our rapid growth are presently available in data processing for programmer/analysts whose responsibilities will include applications in accounting, material requirement planning, order entry/billing, shop floor control and other areas. Your work will be primarily in new development, and in defining applications, designing and programming, and installing the applications with project leaders supervision.

Position requires a minimum of 3 years OS applications, with high proficiency in ANS and COBOL. Must have personally designed, program and installed a multi module medium to large scale OS application. Other helpful experience would include on-line transaction applications (CICS), interactive programming (VM/370), BOM, MRP, shop floor, costing, inventory, and structured designing and programming.

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Data Processing

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Applicants should have 2-3 years recent COBOL experience. IBM OS preferred.

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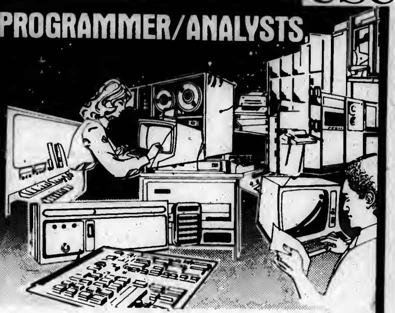
PROGRAMMER/ANALYSTS



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SENIOR SYSTEMS ANALYST —3-5 years experience as a systems analyst including DOS/POWER/VS; ANS COBOL; DATA COMMUNICATIONS/DATA BASE (CICS). Specific experience as a project leader in insurance data processing required. Property and casualty (premium accounting and claims processing) desirable.

Competitive starting salaries, excellent benefits program and opportunities for career growth.

Call now or send resume to:

Morrison Incorporated

Human Resources Department
First National Bank Building
P.O. Box 2608
Mobile, Alabama 36625
205/432-9711 Extension 263

Computer Scientists

San Francisco Bay Area

Excellent career opportunities currently exist at the Lawrence Livermore Laboratory for experienced Computer Scientists. The Laboratory is involved in applied science R&D and is operated for the Department of Energy.

Lawrence Livermore Laboratory has one of the largest high-speed computer systems in the world, including extensive interactive time-sharing capability. Our needs require that we constantly advance the state-of-the-art in the computer field. We have an immediate need in the following areas:

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A Software Consultant is needed with excellent interpersonal skills to coordinate consultant services to the user community. Will also assume responsibility for establishing future consulting activities and policy, training other consultants, and providing programming support in the areas of library and utility routine software. Will be expected to keep abreast of software developments as required to maintain an effective consulting service. This position offers the opportunity to broaden one's knowledge of operating systems and local networks. Applicants should have a minimum of 3 years' strong computer experience in a large-scale machine environment with an emphasis on FORTRAN and debugging techniques. A knowledge of timesharing and user-oriented systems software or a knowledge of the CDC software product set is highly desirable.

DOCUMENTATION AND EDUCATION

A Computer Scientist with a strong background in educational theory and techniques is needed to plan, organize and implement a computer education program. Activities include investigating and developing computer-assisted and video-assisted instruction. Our educational effort is directed toward improving skills of our computer users as well as providing professional development of computer science personnel. This job may also involve user consulting functions. Applicants should have a minimum of 3 years' experience in Computer Science as well as experience in educational theory and techniques. And advanced degree in Computer Science and a knowledge of large scale computers and timesharing is highly desirable.

If you have skills to offer in the above areas, or computer experience that may match our wide range of other career opportunities, please send your resume and salary history and requirements to Roger Wong, Employment Division, Lawrence Livermore Laboratory, P.O. Box 808 Dept. KCW-108, Livermore, CA 94550. U.S. Citizenship Required. An Equal Opportunity Employer M/F/H/V.

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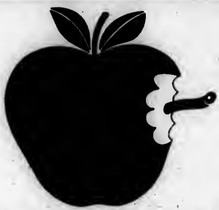

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Should possess one to three years experienca in Oata Base maintenance programming utilizing IDS. Applicants with strong experience in IMS or DMS may be considered.

PROGRAMMER/ANALYST

Should have at least six years background utilizing Honeywell software and H6000 equipment. COBOL programming experience to include materials/maintenance management applications. Other backgrounds may be considered based on training and experience.

In addition to paying your transportation and relocation expenses Bell Helicopter will provide you with a highly-competitive income and a generous benefits package which includes a housing supplement, travel and cost-of-living allowances, and overseas bonuses

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An immediate opening exists for a Programmer/Analyst with a minimum of 1-2 years SYS/3, RPGII experience. CCP or manufacturing experience a plus. Excellent salary and fringe benefits. Send resume in confidence to:

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Personnel Department
Baptist Medical Center
Baptist Medical Center Plaza
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Little Rock, Arkansas 72201
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TEXAS A&M UNIVERSITY offers the following job opportunities to work with an Amdahl 470 V/6 Computer.

Systems Programmer
Requires at least two years experience in IBM software systems programming.

Operations Manager
Requires experience in hiring, training, and scheduling operators and in other aspects of computer operations management.

Qualified applicants should resumes to: Employment Manager, Personnel Department, Texas A&M University, College Station, Texas 77843.

Equal Employment Opportunity
Through Affirmative Action

Leading edge medical facility in Central Texas has opening for experienced programmer analyst. Fast growing data processing shop with heavy ongoing application. Analyst will be thrust into ambitions development schedule in a DOS/VS, CICS, DL/1 and 3790 environment. Applicants must have minimum of 5 years of Programmer Analyst experiece in DB/DC applications & must have COBOL skills. Salary negotiable. Excellent benefits including free parking and 100% free outpatient services.

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All inquiries will be held in strict confidence.

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Opportunity to work in a Hospital environment located on a major Midwest Medical Campus. Individual should be familiar with hospital data processing applications and have ability to interface between user departments and Data Processing. Career opportunity with comprehensive fringe package. Please include salary requirements with response to Larry D. Wise, Assistant Administrator, Wishard Memorial Hospital, Indiana University Medical Center, 1001 West Tenth Street, Indianapolis, IN 46202
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Major building materials company of Jim Walter Corporation has positions available at its headquarters location.

Requires 2 to 5 years experience in systems design and programming. Experience should include COBOL, CICS in an OS/VS environment.

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Celotex

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programmer/analyst

Due to expansion of the Data Processing function, we are searching for 3 experienced Programmer/Analysts. We are starting from the beginning and designing a fully integrated, on-line, manufacturing information reporting system.

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1. 2 or more years in manufacturing environment - job shop experience a plus.
2. Extensive COBOL programming background.
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5. Demonstrated ability to work with user departments to provide a system to fit their needs.

We offer a modern working environment, competitive salary, good fringe benefits, friendly co-workers and most of all, a superior challenge.

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Requires expertise in OS/VS, JCL, IBM utilities, DASDI concepts and technical aspects of computer operations. Supervises four operations analysts in monitoring computer systems, maintaining production procedures etc.

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Requires experience using IBM assembler language in an OS, DOS or PARS/ACP environment; experience using PL/1 in an IBM CICS/OS environment; or experience using IMS in a DB/DC environment.

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PROGRAMMER/ANALYST

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The right candidate will have a minimum of 2 years technical background, COBOL expertise, and experience in communications or mini-computer systems. Experience with Honeywell 6000 Series a plus. A total of 5 years experience in Data Processing or related fields desired.

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We are a Southeastern based Data Center of a Fortune 500 manufacturer with immediate needs for experienced Systems personnel. In additon to these immediate openings, we have budgeted positions for January 1979.

Planned systems enhancements are: major hardware/software upgrade to 370/168 MVS/IMS; development and implementation of a Corporate Data Base to support all manufacturing, divisional, and administrative users.

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Unless otherwise specified, each position requires a bachelor's degree in computer related field and a minimum of four years of appropriate experience.

Minicomputer Systems Programmer

For several administrative minicomputer systems. Two years of systems experience is required. Position requires routine software maintenance as well as the design and implementation of new systems software.

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For large-scale computing system. Compiler or data-base experience is helpful. Position requires routine software maintenance, with emphasis on compilers, libraries, and data-base processors.

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With experience using statistical packages and good background in Fortran and an assembly language; position will be responsible for training, documentation, and consultation required by students and faculty.

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With experience using a variety of user packages as well as familiarity with CAI (computer assisted instruction) and CMI (computer managed instruction) techniques; position will be responsible for assisting university faculty and research personnel in identifying their potential uses of computer facilities and providing technical skills necessary for implementing software to answer those needs.

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For Wyoming Higher Education Computer Network. The academic program for the WHECN is in its initial stage. The person in this position will be involved in the coordination of all aspects of the academic computing activities. This position will also require helping to identify potential applications and maintaining a central program library. Some in-state travel will be required.

Programmer/Analyst

for administrative data processing. Position requires two years of systems analysis and design experience in addition to four years of programming business data processing applications (COBOL is a must), and a proven capability for developing and directing the efforts of a large system. Experience with higher education administrative systems or on-line data base management systems a plus. Position requires working with mini-computers and large mainframes with on-line and batch applications. This person will carry full responsibility for a project from feasibility study through final installation, and will often direct the effort of others.

Applications should be sent to: Personnel Office, P.O. Box 3422, University Station, Laramie, WY 82071. Applications must be received by October 16, 1978. The University of Wyoming is an Equal Opportunity, Affirmative Action employer.

HIGH LEVEL PROGRAMMERS

Maryland based headquarters of Management Services organization has immediate openings for high level, technically skilled programmers with proven record of accomplishment. Minimum 5 years' total experience in ANSI-COBOL language, knowledge of FORTRAN helpful. This experience should include 3-4 years' on large scale systems such as:

Honeywell 6600 with knowledge of TDS and IDS desirable.

IBM OS/370-158, 168 with knowledge of IMS and CICS desirable.

UNIVAC 1108, Exec-8, with knowledge of TIP and DMS desirable.

Excellent benefit package, competitive salary, paid relocation and a professional working environment programming on a dual processor Honeywell 6640. Please send resume and salary requirements to:

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Persons interested should submit applications, vita, and names of three references to: Office of Systems and Computing, 338 French Administration Building, Washington State University, Pullman, Washington 99164, before November 17, 1978.

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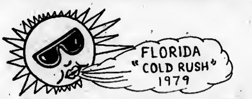

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senior education analysts/edp

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- maintaining and developing the education catalog used in our structured human resource management system

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We offer starting salaries in the low to mid twenties, plus comprehensive benefits. Qualified candidates are invited to forward a resume with salary history to: Mr. Philip Fee, Personnel Department

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HIGH LEVEL PROGRAMMERS

Maryland based headquarters of Management Services organization has immediate openings for high level, technically skilled programmers with proven record of accomplishment. Minimum 5 years' total experience in ANSI-COBOL language, knowledge of FORTRAN helpful. This experience should include 3-4 years' on large scale systems such as:

Honeywell 6600 with knowledge of TDS and IDS desirable.

IBM OS/370-158, 168 with knowledge of IMS and CICS desirable.

UNIVAC 1108, Exec-8, with knowledge of TIP and DMS desirable.

Excellent benefit package, competitive salary, paid relocation and a professional working environment programming on a dual processor Honeywell 6640. Please send resume and salary requirements to:

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Programmers/ Analysts

ITT Rayonier, a dynamic forest products company, is seeking talented individuals to join the staff of its New York-based DP organization.

To qualify, you must have a degree in Accounting, Business or Computer Science, or equivalent; 2-3 years experience desirable. In addition, the candidates we seek must have project leader capability including good communications skills and the ability to work effectively in a team environment.

Attractive starting salary, comprehensive benefits, growth opportunity.

Please send resume and salary history in confidence to: Ricci Anderson, ITT Rayonier Inc., 605 Third Avenue, New York, N.Y. 10016.

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VM/370 SOFTWARE SUPPORT ANALYST

ENVIRONMENT: IBM 3031 running CMS, SVS, DOS/VS, and MVS under VM plus CICS/VS, DBMS (SYSTEMS 2000), HASP, JES 2, COBOL, FORTRAN, APL, PL1 and other system software.

We require 6 months to 2 years of VM/370 systems programming with a math or computer science degree or equivalent experience.

We offer an excellent salary and benefit package with the opportunity for steady professional growth. For confidential consideration send your resume to or call:

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A thorough knowledge and experience in Data Base and Data Communications qualifies you on this Burroughs medium-system computer which is responsible for all administrative requests in this two-year vocational education environment, i.e. student records, payroll, accounts payable/receivable.

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Pre and Post sales support functions combined with a varied customer base will provide continued challenge in this position. A minimum of three (3) years as a Systems Engineer, Systems Analyst or related position is required. A degree in Computer Science or an associated discipline is preferred.

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A quality product line backed by professional support personnel will enhance your position as a Marketing Representative. If you have a proven record in computer sales with three (3) years experience, a rewarding future awaits you at MEMOREX.

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You will have the responsibility for the overall activities of the distribution center. This includes traffic, inventory control and all material handling functions. Candidate will have had previous distribution center management experience centered around positive customer relations.

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Individual will be responsible for all maintenance activities or peripheral equipment and main memory systems. Background should include technical school or two (2) to five (5) years experience preferably in 360/370 plug compatibles.

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This regional position in Field Engineering involves problem determination and resolution from a software approach. Candidate should be skilled in JCL, Utilities, Assembler, Access Methods and the internals of a VS Operating System. Travel within the region is required.

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P D P 11
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Working in a large scale IBM 370/OS environment, the successful candidate will be responsible for managing the development and support of financial, administrative and manufacturing systems applications.

Position requires minimum of 3 years management experience in applications programming demonstrating thorough knowledge of structured design, modular programming techniques and data base concepts (TOTAL experience desired). Degree (or equivalent) in appropriate disciplines also necessary.

SYSTEM ANALYSTS & PROGRAMMER ANALYSTS

Candidates must have degree (or equivalent) in applicable field, with system analysis or programming experience including IBM 370/OS in a manufacturing environment.

Please send your resume to: Mr. Ed Epperson, Corporate Employment Manager, ITT North Electric Company, P.O. Box 688, Galion, Ohio 44833.

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Two to six years experience in Systems and/or Programming is necessary. H-600/6000/66, COBOL, IDS, TDS & GMAP desirable but not mandatory. Experience in Teleprocessing and On-line Data Base applications would be an asset. A four year college degree is preferred. Excellent salary structure and fringe benefit program. Please submit resume with salary history in confidence to Personnel Manager:

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SYSTEMS PROGRAMMER

PDP 11-70 Unix

Our Scientific Computer Center is installing a PDP 11-70 with Unix time-sharing system for a variety of academic and research applications. We seek a bright, energetic and well-organized individual to provide technical support for the operations systems, communication capabilities, data base management systems and statistical packages, and provide technical consultation for applications programmers. This is a key position involving substantial responsibilities and independent technical judgment. BS degree plus 2 years relevant experience preferred. Salary and fringe benefits are unusually attractive. To apply send resume with salary history/requirements to Mr. Jeff Rosengarten, Personnel Department.

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Attn: J.A. Hewett

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SYSTEMS ANALYST

EDUCATION: B.S. in Computer Science

EXPERIENCE: At least 5 years experience as a Programmer Analyst or Systems Analyst developing information systems in scientific environment using FORTRAN on medium to large scale computers. At least two (out of five) years experience should be on DEC PDP 11 series computers.

Respond with resume, salary history and requirements to:
Miss Patricia Pringle, Employment Recruiter

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Must have demonstrated abilities to work with faculty and research personnel. The candidate must have had at least two yrs. of experience in either:

a) A higher educational institution working with computers-software and/or hardware
or. b) Appropriate graduate work in Computer Sci., or Electrical Eng. or Physical Sci.
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Send resumes no later than Nov. 1, 1978 to: G. Kleiner, CCNY-Computer Center, 138th Street & Convent Ave., N.Y., N.Y. 10031

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- Key account responsibility
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Your experience must include:

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ARIZONA STATE UNIVERSITY — SYSTEMS SUPPORT — UNIVAC 1100

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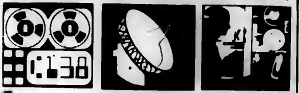
PDP 11/70

Systems Support Analyst I. Position requires 1 to 2 years experience with a PDP 11 running RSTS/E, experience with IAS helpful but not required. Position will be responsible for maintaining technical libraries of documentation and software. This position will report to the PDP-11 Project Leader. Annual starting salary: $14,070.

Applicants for all positions must be able to communicate effectively with management and technical personnel, both verbally and in writing. Salary history should also be included with resume. Application period ends 12/October/78. Resumes are to be sent to Arizona State University, Personnel Dept., ASB 310, Tempe, AZ 85281. A criminal history check will be required of all successful applicants. Arizona State University is an Equal Opportunity/Affirmative Action Employer.



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*UNIX is a Tradamerk of Ball Laboratorias

SPECIAL PROJECTS - experiance needed in communicetions and surveillance systems. These real-time systams ara mini-computer centarad, howevar, thare is growing involvement of both microprocassors end larga computers such as IBM 370's. The predominant demand is for paople with PDP 11/70 and RSX 11 expariance. Data Genaral or other minicomputer experiance is elso veluable. Because of the classified nature of these projects, en existing or very racent top secret clearanca is requirad.

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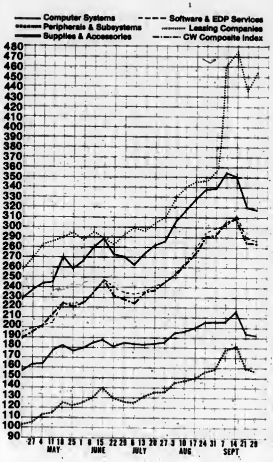

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MOTOROLA

Three Months Ended June 30

	1978 (000)	1977 (000)
Shr Ernd	$1.08	$.92
Revenue	548,221	439,896
Earnings	32,812	27,817
6 Mo Shr	1.99	1.71
Revenue	1,041,910	878,860
Earnings	60,546	51,835

NORTHERN TELECOM

Three Months Ended June 30

	R1978	R1977
Shr Ernd	$.98	$.93
Revenue	388,381,000	342,418,000
Tax Cred	2,356,000	808,000
Earnings	27,269,000	24,783,000
6 Mo Shr	1.78	1.70
Revenue	676,312,000	649,909,000
Tax Cred	4,712,000	1,186,000
Earnings	48,385,000	45,085,000

R-Amounts in Canadian dollars.

TEKTRONIX

Year Ended May 27

	1978	1977
Shr Ernd	$3.18	$2.48
Revenue	598,886,000	454,958,000
Earnings	56,846,000	43,971,000
3 Mo Shr	.83	.80
Revenue	159,842,000	125,306,000
Earnings	14,687,000	14,172,000

COMPUTER NETWORK

Three Months Ended June 30

	1978	1977
Shr Ernd	$.25	$.26
Revenue	4,671,000	3,377,000
Earnings	423,000	319,000

DATA 100

Three Months Ended June 30

	1978	1977
Shr Ernd	$.18	$.33
Revenue	39,894,000	33,411,000
Tax Cred	.....	155,000
Earnings	1,111,000	1,237,000
6 Mo Shr	.43	.68
Revenue	78,641,000	62,348,000
Tax Cred	......	295,000
Earnings	2,553,000	2,551,000

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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, SEPTEMBER 27, 1978

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

EXCH		1978 RANGE (1)	CLOSE SEP 27 1978	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
A	AMDAHL CORP	28- 69	55 1/4	-2 1/8	-3.7
N	BURROUGHS CORP	59- 87	76 1/8	-1 1/2	-1.9
O	COMPUTER AUTOMATION	23- 44	33	+ 1/4	+0.7
N	CONTROL DATA CORP	23- 44	36 1/2	- 1/4	-0.6
O	CRAY RESEARCH INC	21- 74	61	+1	+1.6
N	DATA GENERAL CORP	42- 71	61 7/8	-2 5/8	-4.0
N	DATAPOINT CORP	34- 75	65 5/8	- 3/8	-0.5
N	DIGITAL EQUIPMENT	39- 54	48 3/4	- 3/8	-0.7
N	ELECTRONIC ASSOC.	2- 13	9 3/4	+1	+11.4
A	ELECTRONIC ENGINEER.	11- 19	14 3/4	+1 1/8	+8.2
O	FOUR-PHASE SYSTEMS	19- 46	38 7/8	+1 1/8	+2.9
N	FOXBORO	28- 40	37 1/4	+ 3/4	+2.0
O	GENERAL AUTOMATION	7- 26	18 1/8	- 1/8	-0.6
O	GRI COMPUTER CORP	1- 2	1 3/4	0	0.0
N	HEWLETT-PACKARD CO	62- 93	85 7/8	- 1/4	-0.2
N	HONEYWELL INC	43- 72	64 3/8	- 7/8	-1.3
N	IBM	236-305	275	-9 1/2	-3.3
O	MANAGEMENT ASSIST	9- 29	21 1/2	-1	-4.4
O	MICRODATA CORP	10- 25	18 1/2	-1	-5.1
O	MINI-COMPUTER SYST	5- 8	7 1/2	- 3/8	-4.7
O	MODULAR COMPUTER SYS	7- 17	13 1/2	-1 1/4	-8.4
N	NCR	37- 67	59 5/8	-2 7/8	-4.5
N	PRIME COMPUTER INC	23- 43	35 1/4	+1 3/8	+4.8
N	PERKIN-ELMER	17- 28	25	- 1/8	-0.4
N	RAYTHEON CO	29- 38	47 3/8	-1 1/8	-2.3
N	SPERRY RAND	33- 49	44 1/4	-1 3/8	-3.0
A	SYSTEMS ENG. LABS	11- 24	16 3/4	- 5/8	-2.1
A	WANG LABS.	12- 32	25 3/8	- 1/4	-0.9
	LEASING COMPANIES				
O	BOOTHE COURIER CORP	13- 20	19 1/4	0	0.0
O	COMDISCO INC	5- 19	17 3/4	+ 1/2	+2.8
A	COMMERCE GROUP CORP	1- 1	5/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 7	5 1/4	+ 3/8	+7.6
N	DATRONIC RENTAL	1- 2	2 1/4	+ 3/8	+20.0
A	DCL INC	3- 5	4 3/8	- 1/8	-2.7
N	DPF INC	8- 14	11 3/8	+ 3/8	+3.4
N	ITEL	16- 36	31 7/8	+1 3/8	+4.5
N	LEASCO CORP	24- 36	31 3/8	+ 5/8	+2.0
O	LEASPAC CORP	1- 4	2 1/2	0	0.0
A	PIONEER TEX CORP	4- 7	5	+ 3/8	+8.1
N	U.S. LEASING	13- 20	17 7/8	+ 1/4	+1.4

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

EXCH		1978 RANGE (1)	CLOSE SEP 27 1978	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 2	1 1/2	- 1/8	-7.6
O	ANACOMP INC	8- 22	16 1/4	+1	+6.3
A	APPLIED DATA RES.	8- 17	15	- 3/8	-2.4
N	AUTOMATIC DATA PROC	24- 36	31	+ 1/4	+0.8
O	COLEMAN AMERICAN COS	1- 2	1 1/2	- 3/8	-20.0
O	COMPU-SERV NETWORK	7- 12	8 1/4	+ 1/4	+3.1
O	COMPUTER HORIZONS	1- 9	8 1/4	0	0.0
O	COMPUTER NETWORK	8- 16	11 7/8	+ 1/8	+1.0
N	COMPUTER SCIENCES	8- 17	14	+ 1/2	+3.7
O	COMPUTER TASK GROUP	1- 4	3 1/4	0	0.0
O	COMPUTER USAGE	2- 4	3 3/4	+ 1/4	+7.1
O	COMSHARE	6- 19	17 1/4	- 1/4	-1.4
O	DATA DIMENSIONS INC	4- 9	7 1/8	- 7/8	-10.9
O	DATATAB	1- 2	1 3/8	+ 1/8	+10.0
N	ELECTRONIC DATA SYS.	15- 25	21 7/8	- 3/4	-3.3
O	INSYTE CORP	1- 3	1 3/4	0	0.0
O	IPS COMPUTER MARKET.	2- 3	3 1/4	0	0.0
O	KEANE ASSOCIATES	3- 6	6	0	0.0
O	KEYDATA CORP	1- 3	2	0	0.0
A	LOGICON	11- 19	15 1/4	-1 3/4	-10.2
A	MANAGEMENT DATA	1- 1	7/8	0	0.0
A	NATIONAL CSS INC	15- 56	30 5/8	+ 7/8	+2.9
O	NATIONAL DATA CORP	7- 13	10 7/8	- 5/8	-5.4
A	ON LINE SYSTEMS INC	17- 30	26 3/8	- 1/4	-0.9
N	PLANNING RESEARCH	4- 10	8 5/8	0	0.0
O	PROGRAMMING & SYS	1- 1	1 1/4	0	0.0
O	RARIDATA INC	3- 7	6 1/2	+ 3/8	+6.1
O	REYNOLDS & REYNOLDS	18- 36	28 1/2	-1 1/2	-3.0
O	SCIENTIFIC COMPUTERS	3- 9	8 3/8	0	0.0
O	TYMSHARE INC	18- 33	27 3/8	-2 1/2	-8.3
A	UPS SYSTEMS	5- 8	7 5/8	+ 7/8	+12.9
N	WYLY CORP	1- 7	5 7/8	- 3/8	-6.0
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	14- 32	26 3/8	- 1/8	-0.4
O	ADVANCED MEMORY SYS	7- 18	16 3/8	- 1/8	-0.7
N	AMPEX CORP	10- 19	16 1/4	0	0.0
O	ANDERSON JACOBSON	5- 10	7 3/4	- 1/8	-1.5
N	APPLIED DIG DATA SYS	13- 22	14 5/8	-1 1/4	-8.0
O	BEEHIVE INT'L	4- 7	6 3/8	0	0.0
A	BOLT, BERANEK & NEW	6- 14	15 1/2	+ 3/4	+3.8
N	BUNKER-RAMO	10- 20	17	- 1/4	-1.4
A	CALCOMP	3- 13	10 7/8	+ 3/8	+3.5
O	CAMBRIDGE MEMORIES	3- 9	6 5/8	- 1/8	-1.8
N	CENTRONICS DATA COMP	16- 36	33 1/2	+ 3/4	+2.2
O	COGNITRONICS	1- 4	2 1/4	+ 1/4	+12.3
O	COMPUTER COMMUN.	6- 12	10	0	0.0
O	COMPUTER CONSOLES	4- 10	8 3/4	+ 1/2	+6.0
A	COMPUTER EQUIPMENT	3- 6	5 1/8	- 1/4	-4.6
O	COMPUTER TRANSCEIVER	1- 3	3 1/8	3	0.0
O	CONTEN	6- 38	31 3/4	+ 5/4	+2.4
N	CONRAC CORP	19- 26	21 3/4	- 1/4	-1.1

EXCH		1978 RANGE (1)	CLOSE SEP 27 1978	WEEK NET CHNGE	WEEK PCT CHNGE
O	DATA ACCESS SYSTEMS	3- 14	12	0	0.0
O	DATA 100	9- 20	19 1/4	0	0.0
A	DATA PRODUCTS CORP	15- 25	18 1/2	-1 1/8	-3.7
O	DATUM INC	2- 6	4 5/8	- 1/8	-2.6
O	DECISION DATA COMPUT	2- 6	4 3/8	0	0.0
O	DELTA DATA SYSTEMS	1- 1	5/8	0	0.0
A	DOCUMATION INC	6- 34	29	- 5/8	-2.1
O	DATARAM CORP	6- 31	26 1/2	+1	+3.9
N	ELECTRONIC M&N	4- 9	6 5/8	- 1/8	-1.8
O	FABRI-TEK	1- 2	1 5/8	-	-4.1
O	GENERAL COMPUTER SYS	1- 3	2 3/8	0	0.0
N	HAZELTINE CORP	10- 17	15	- 1/4	-1.6
N	HARRIS CORP	17- 36	34	+ 1/2	+1.4
O	INFOREX INC	6- 11	9 1/2	- 1/4	-2.5
O	INFORMATION INTL INC	8- 12	9 3/4	0	0.0
O	INTEL CORP	39- 62	52 1/2	-1	-1.8
A	LUNDY ELECTRONICS	4- 8	6 7/8	0	0.0
O	MSI DATA CORP	12- 19	14 3/8	-1 1/2	-9.3
N	MEMOREX	27- 59	48 1/2	-2 1/2	-4.9
N	MOHAWK DATA SCI	6- 13	11 3/8	- 1/4	-2.1
O	OMER	2- 3	3 1/2	0	0.0
O	PENRIL CORP	5- 12	10	0	0.0
N	PERTEC CORP	9- 17	14 3/4	- 1/4	-1.6
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	QUANTOR CORP	2- 5	2 1/2	0	0.0
O	RECOGNITION EQUIP	7- 13	10 7/8	- 1/2	-4.3
O	SCAN DATA	1- 5	3	- 1/2	-14.2
N	STORAGE TECHNOLOGY	19- 46	31	-1 3/8	-4.2
O	T BAR INC	11- 20	18 1/2	- 1/4	-1.3
O	TALLY CORP.	4- 9	7 5/8	- 1/8	-1.6
A	TEC INC	6- 13	11	+ 3/4	+7.3
N	TEKTRONIX INC	33- 30	46 1/2	- 1/4	-0.3
N	TELEX	3- 9	7 1/2	+ 1/4	+3.4
O	TESDATA SYSTEMS CP	13- 23	15 1/2	-4 1/2	-22.5
O	WILTEK INC	1- 1	7/8	0	0.0
	SUPPLIES & ACCESSORIES				
A	AMERICAN BUS PRODS	6- 11	9 3/4	- 1/8	-1.2
O	BALTIMORE BUS FORMS	2- 3	2 1/2	0	0.0
A	BARRY WRIGHT	14- 30	26 1/4	+ 1/2	+1.9
O	CYBERMATICS INC	1- 1	1	- 1/4	-20.0
O	DUPLEX PRODUCTS INC	18- 30	26 1/4	-1	-3.6
N	ENNIS BUS. FORMS	8- 17	12 7/8	-1 1/8	-8.0
N	3M COMPANY	43- 66	58 5/8	-1 3/8	-2.2
O	MOORE CORP LTD	26- 34	30	- 1/4	-0.8
N	NASHUA CORP	18- 37	31 3/4	+1 3/4	+3.8
O	STANDARD REGISTER	20- 27	24 3/4	+ 1/2	+2.0
A	TAB PRODUCTS CO	9- 16	14 1/8	- 1/8	-0.8
N	VARCO	19- 28	25 3/8	+ 1/2	+1.9
A	WABASH MAGNETICS	10- 22	19 1/4	+ 1/4	+1.3
N	WALLACE BUS FORMS	18- 33	28 1/4	- 3/4	-2.3

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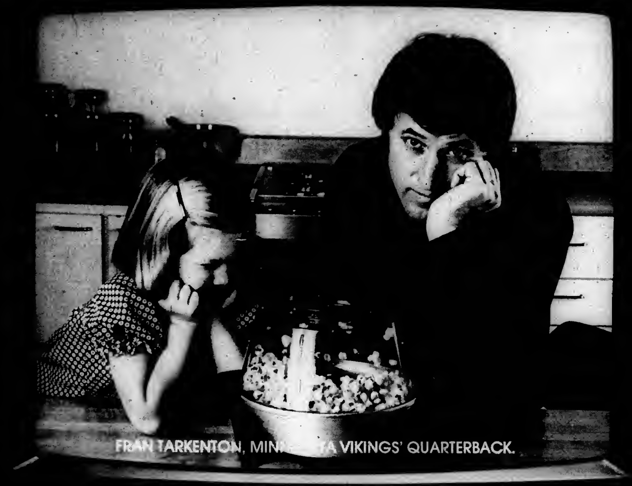

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